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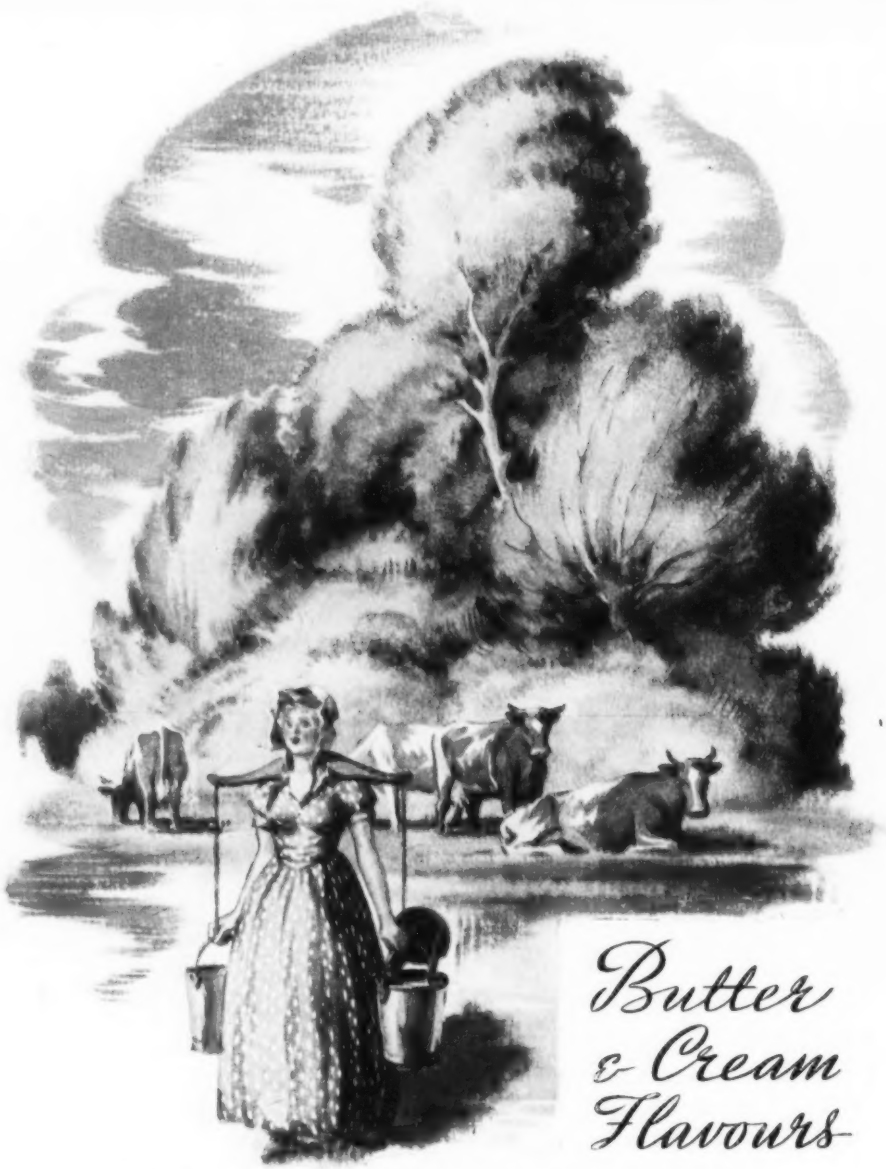

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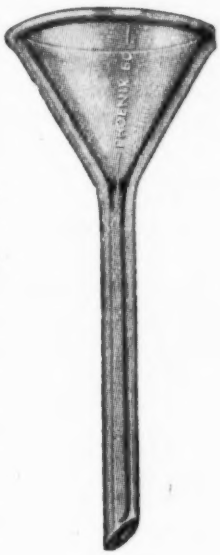

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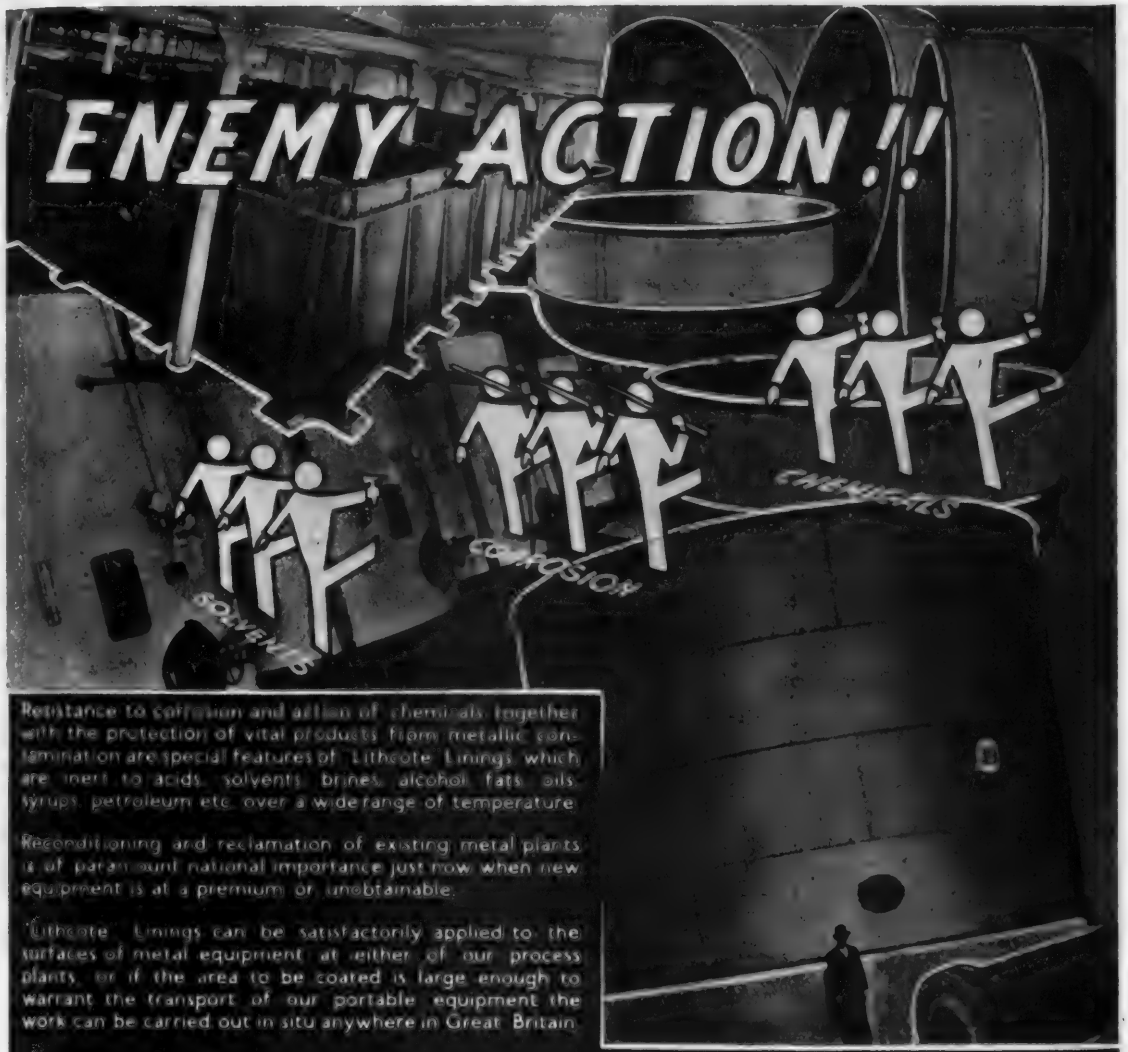

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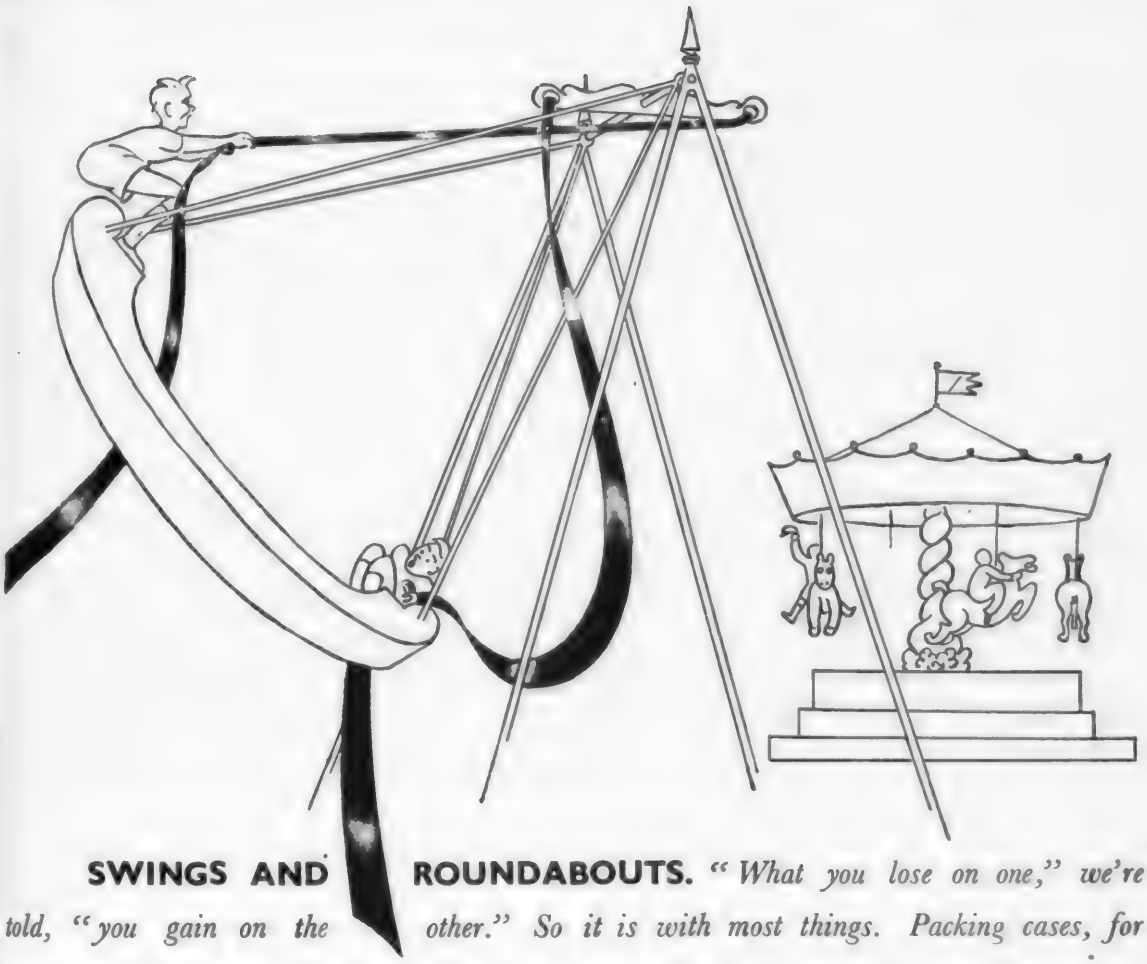

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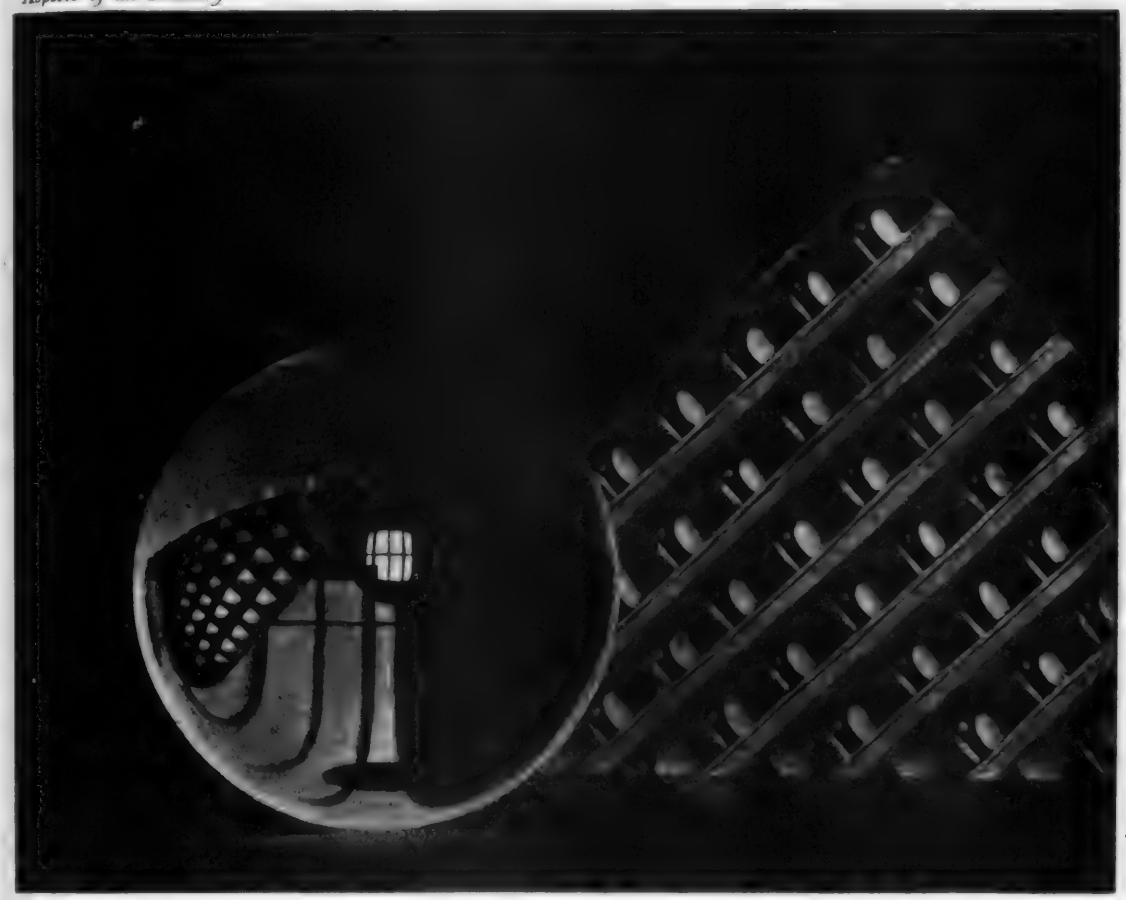

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Let us consider for a moment the effect on fuel consumption of air in steam spaces. First, how does air get there? Before steam is turned on, the mains and equipment will be full of air. When steam enters, the air will be pushed along in front of it. Some of the air will find a way out through the condense drains, but the rest will mix with the steam. All the time steam is on, more air and incondensible gases will come forward mixed with the steam.

What happens to all this air which cannot find a way out through the condense drains? It is carried by the steam to the points of condensation (anywhere on the inner walls of the equipment), but whereas the steam will condense the air cannot and it is left in the form of an insulating film.

Now for the effect on fuel consumption.

It is known that the temperature of an air/steam mixture is lower than the corresponding saturated steam temperature. For example, steam at 50 lbs. pressure should be at 297 deg. F., but a 10 per cent. mixture of air will lower this to 291 deg. F., and a 20 per cent. mixture (by no means uncommon) will bring it down to 283 deg. F.

On top of this, the insulating film of air, already mentioned, is a serious hindrance to heat transference. Only 1 per cent. of air can reduce the efficiency of the heating surface by as much as 11 per cent.

To maintain output you must either raise the steam pressure (and increase fuel consumption) or get rid of the air. There can be only one answer.

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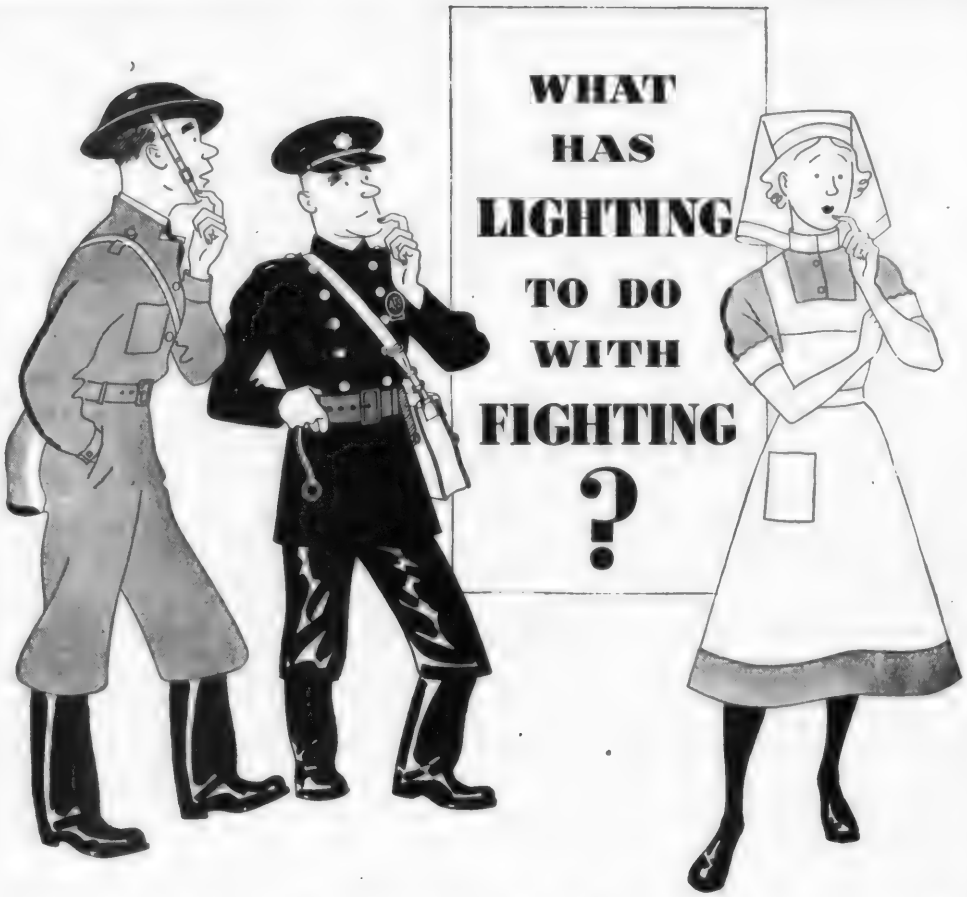

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CONCENTRATION BY INFRA-RED RAYS

A Laboratory Evaporator for concentration of sensitive liquors utilising entirely new principles of heat transfer.

(Patents applied for)

Also **INFRA-RED RAY** Laboratory Driers for experimental work.

FOOD PRODUCTS

can be prepared as a dry powder on the Kestner Patent Spray Drier as shown, more **EASILY, CHEAPLY,** and **EFFICIENTLY** than by any other method.

Write for Leaflet No. 264

KESTNER EVAPORATOR & ENGINEERING CO. LTD.

Chemical Engineers—5, Grosvenor Gardens, London, S.W.1

For 60 Years Pioneer Caramel Specialists

EGYPT FOR PYRAMIDS

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LAMBERTS *for* CARAMEL

WHEN you think of Egypt, you automatically think of the Pyramids. The word "Caramel" similarly recalls the name of "Lamberts." Lamberts have specialised in Caramel production for over 60 years and their knowledge and experience makes Lamberts Caramel unrivalled for quality and reliability.

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IBEX

ACID CALCIUM PHOSPHATE 80% for the Self-raising and Cake Flour Manufacturer.

PURON

ACID SODIUM PYROPHOSPHATE Full Strength: for the Baking Powder Manufacturer.

ANTELOPE

ACID SODIUM PYROPHOSPHATE reduced to Cream of Tartar Strength for the Baker.

War conditions have created some new users of Phosphates for the Chemical Aeration of Foodstuffs. To these we would say that this established practice, represented by the well-known brands of (first introduced by Albright & Wilson over 25 years ago), has been used and relied upon for so many years now that the Milling and Baking Trade look upon these brands as Standard Products. Established Manufacturers of Baking Powder, Cake and Packet Flours are invited to communicate with the Technical Service Department of Albright & Wilson on any problem relating to aeration.

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ACID SODIUM PYROPHOSPHATE The Baker's finest raising powder

PURON

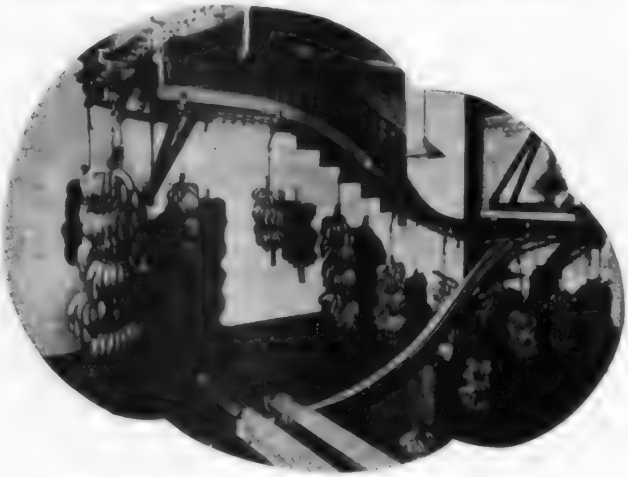
ACID SODIUM PYROPHOSPHATE For high grade baking powder

IBEX

ACID CALCIUM PHOSPHATE 80% the aerator for self-raising flour

SALES OFFICE: PARK HALL, KIDDERMINSTER, WORCS.

FRASER & CHALMERS "WEBB" CONVEYORS



YES, BANANAS ! This particular WEBB installation is handling more essential goods at present, but with the same efficiency which maae it such a grand investment.

These easily installed and cheap to run chain type conveyors have cut costs and time and labour on many a former awkward handling job. The WEBB conveyor can be installed almost anywhere you want, to any kind of structure. Can be used as an overhead system or as a floor type conveyor with equal success. Needs very little space, but can handle goods and materials of practically any kind.

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It is an established fact that one dead rat effectually warns the main body of a colony, and from that time, with incredible cunning, they avoid the spot to continue elsewhere their destructive forays : but today science outmatches this cunning.

The successful methods of the British Ratin Company brings science to bear on the problem of rat infestation—lures rats to their doom in such a way that they are unconscious of the process of their destruction.

The British Ratin Company has no preparation for sale to the general public: it offers a service only.

Fill in the coupon and the Ratin Company's local surveyor will call and give you an estimate for dealing with your infestation.

The Ratin Service is available anywhere in Great Britain and Ireland.

The Service also deals effectively with mice, beetles, cockroaches, and other insect pests.

To THE BRITISH RATIN CO., LTD., 58, Kingsway Corner Buildings London, W.C.2. Tel.: HOLborn 0401

Please ask your Surveyor to call and explain how the Ratin Service (preparation not supplied) deals with rats, mice and insect pests

Name.....

Address.....

.....

Date of appointment..... *Time* .....

RATIN SERVICE

First ALLAYS Suspicion - then DESTROYS Rats

"There's *better than* gold in them thar hills"

NUGGETS are poor fare; in these days of dehydrated food and prefabricated ships we prospect for vitamins instead, and many fields that were close-cropped green for centuries have now given their autumn gold for the second or third year.

Here in the north it's our way to say that the yield is "middling." We believe understatement is better than undernourishment. But whether our job in Food has to do with growing, processing or distributing it we know what we're up against, and those of us who serve the Food Industry at many different points must do our best within the stringent restrictions which now apply.

Butterfields OF SHIPLEY
Builders of Tanks for 50 Years
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FOR BULK TRANSPORT OF LIQUID FOODSTUFFS
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THANKS TO
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Sheet Metal Equipment for Handling Food Products

STORAGE CABINETS.
BINS, CHUTES, MIXERS, SINKS.
DRAINERS, TROLLEYS.
PIPE LINES IN MILD STEEL.
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GREAT WEST ROAD, BRENTFORD

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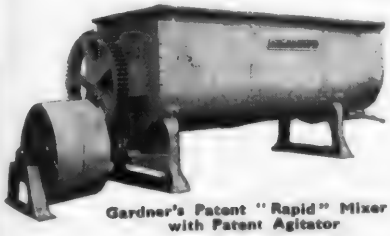
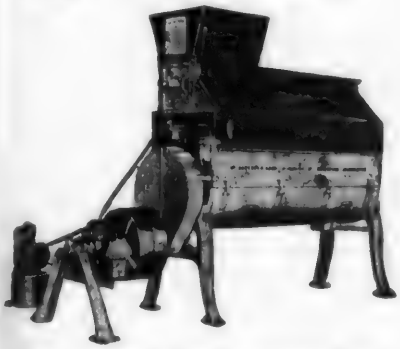
These machines provide THOUGHT FOR FOOD

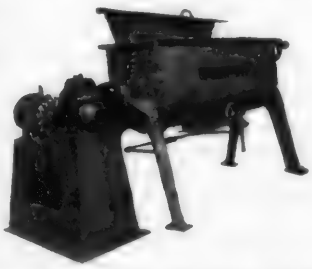


Gardner's Patent "Rapid" Mixer with Patent Agitator

Gardner's Patent "Rapid" Sifting Machine



Gardner's Patent "Rapid" Sifter and Mixer with Sprayer



Gardner's Patent "Rapid" Steam Jacketed Dryer and Mixer

GARDNER'S Machinery for the reducing, sifting, mixing and drying of powders for use in the food industry have been carefully designed to maintain a high standard of product at the lowest possible operating cost. They have proved their outstanding superiority over a period of nearly a century and are the first choice of discriminating manufacturers in all parts of the globe. Many machines have been running continuously for as long as 40 years without breakdown or repair, and they will stand up to any and every sort of climatic conditions. Our service department will be glad to advise on your own reducing process problems without obligation ; just send a sample of your product and we will test it out in our works and let you have our report on the most suitable method of reduction. In our range of models there is one to solve your problem . . . why not get in touch with us NOW ?

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Machinery for the FOOD INDUSTRY

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Imparts that true Butter Flavour Aroma to all confectionery.

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Why? Think of the time lag—temperature change — thermometer reading — eyes — brain — muscular action—valve movement, AND the adjustment can only be a matter of guesswork.

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Please send particulars of Thermostatic Control in its application to Food Storage • Refrigeration • Canning • Process Ovens • Drying • Jacketed Pans • Mixing • Direct Water Heating

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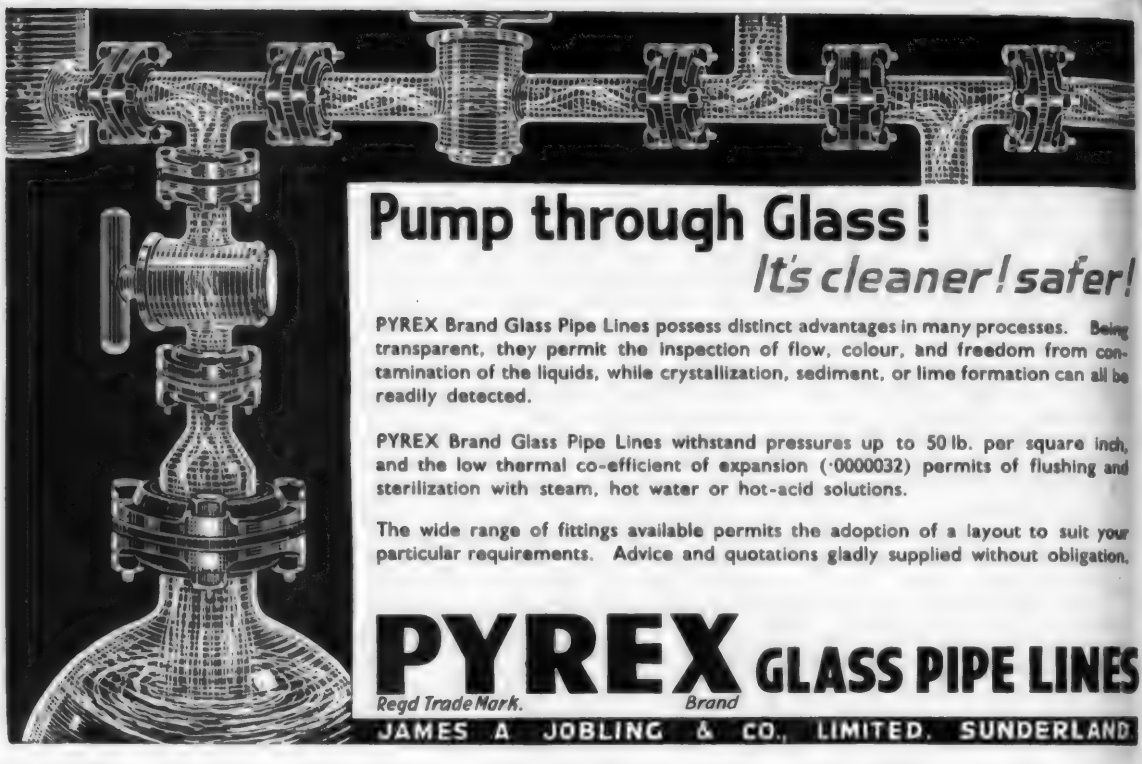

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It's cleaner! safer!

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PYREX Brand Glass Pipe Lines withstand pressures up to 50 lb. per square inch, and the low thermal co-efficient of expansion (·0000032) permits of flushing and sterilization with steam, hot water or hot-acid solutions.

The wide range of fittings available permits the adoption of a layout to suit your particular requirements. Advice and quotations gladly supplied without obligation.

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This typical housewife spends her time 'trying out' dishes in the same conditions which prevail in any ordinary home. She follows the directions given on the label and immediately reports any 'flaws.'

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An eminent firm of Public Analysts makes a periodical inspection of samples taken from every new consignment of both raw materials and finished products as a 'check-up' on purity and food-value.

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As an additional safeguard against faulty materials entering the Factory constant inspections are made during the process of manufacture.

Marshall's TABLE FOODS

MARSHALL'S MALTED MILK LTD.

Contractors to H.M. Government · Packers to the Trade ∴ *Trade enquiries through appointed Agents* - 45, Effra Parade, S.W.2 Tel.: Brixton 7441/2/3

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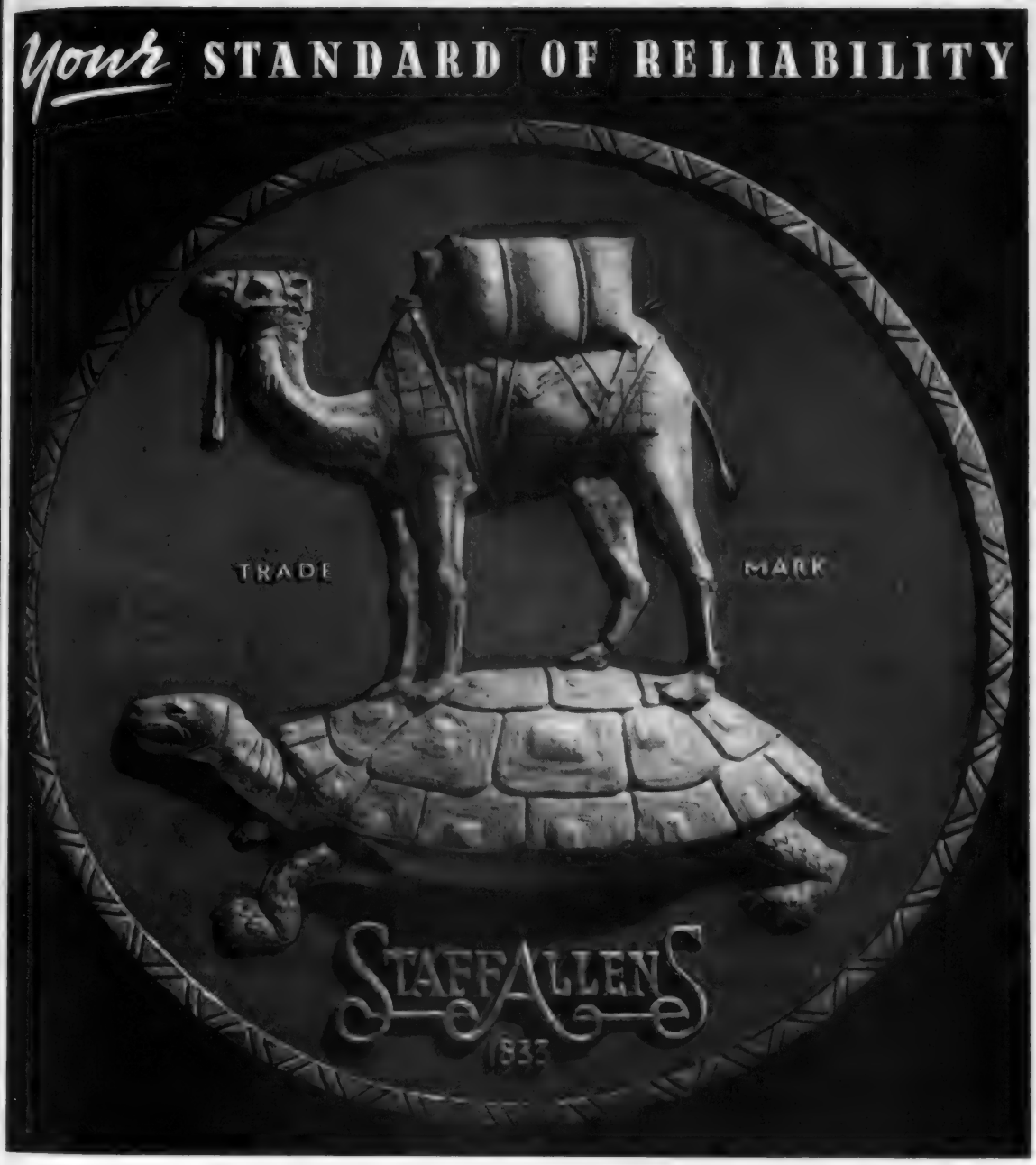

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FOR CONFECTIONERY & FOODSTUFFS

STAFFORD ALLEN & SONS LTD., WHARF ROAD, LONDON, N.1. 'Phone: Clerkenwell 1000 (7 lines)

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THE STANDARD WHICH NEVER Wavers

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The quality and setting standard of "Elpex" —the Apple Pectin—used by the largest jam manufacturers, can be depended upon always to be of unwavering jelly making strength. Actual tests on every batch before despatch insures this. We are still able to fulfil trial orders.

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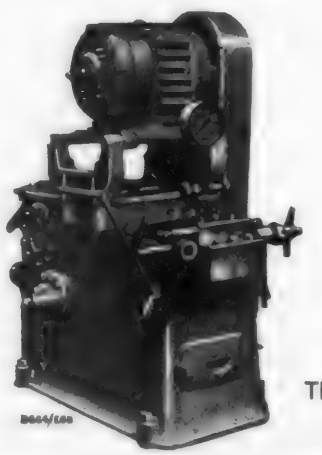
Elpex
APPLE PECTIN

HOMOGENISATION Improves Food Products



The use of substitutes in processed food is unavoidable to-day. The problem of the manufacturer is to maintain the "Appeal to the Palate" and improve the keeping quality. You can do this with

BRUSH
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Write for Publication F.M.E. 66

THE BRUSH ELECTRICAL ENGINEERING CO., LTD.,
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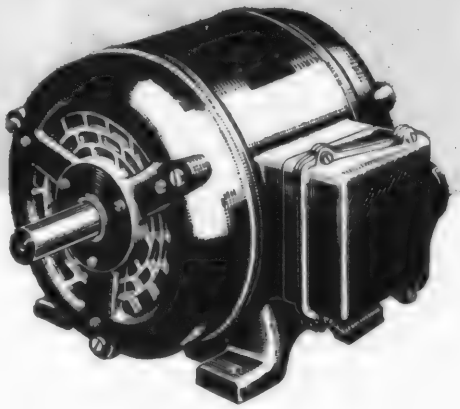

It's cooler inside

No hot spots or insulation stresses with Parkinson balanced ventilation. Another reason for Parkinson Motors' long life.

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Limited

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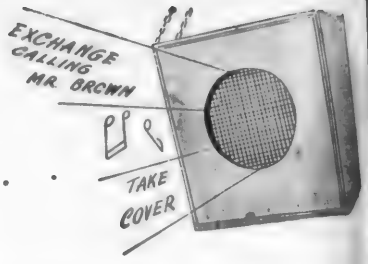

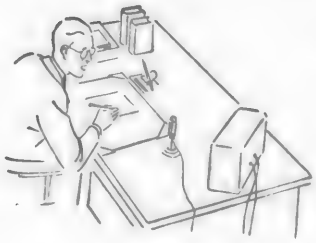

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KEY
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WORKERS are cheered and stimulated, and the pulse of their industry is quickened, by well-chosen music relayed to them. The use of the loud speakers for raid warnings and staff location reassures them that, since executives can always be reached without delay in any emergency, measures for the safety of all can be instantly put into effect. Dictograph Sound Installations humanise the works in which they are installed.

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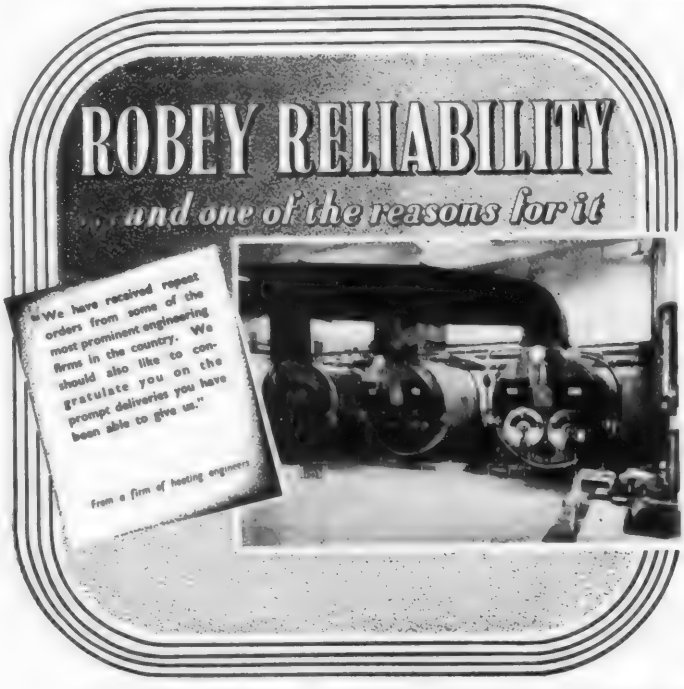
Installation and full maintenance on rental terms. Equipment available NOW for firms substantially engaged on Government work.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. . . and one of the reasons for it
"We have received repeat orders from some of the most prominent engineering firms in the country. We should also like to congratulate you on the prompt deliveries you have been able to give us."
From a firm of heating engineers

Three Robey Economic Boilers arranged for Oil Firing with Urquhart Oil Burning apparatus. Supplied through the Aluminium Plant and Vessel Co. Ltd., to the Bristol Co-operative Society Diary, Bristington.

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Why are Robey Economic Boilers widely used in commercial and industrial concerns to-day? Because when you install a Robey Boiler you install reliability—the reliability built into all Robey products.

Here are the main features of the Economic Boiler—features well known to all its users, and features that are quickly proved with every new installation:

RAPID STEAM GENERATING CAPACITY · LARGE HEATING SURFACE · HIGH EVAPORATIVE DUTY · ECONOMY IN FUEL · HIGH EFFICIENCY · COMPACTNESS

ROBEY
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TO-DAY AND *Tomorrow!*

To give you finer printing — in quality, in sales appeal, in economy—through unexampled facilities, efficiently planned production, quantity buying, tremendous volume. There in a single sentence you have the underlying purpose of "B & B Ltd." the amalgamation that unites three specialized plants equipped with the finest machinery, backed by superb craftsmanship and half a century of priceless experience —to give you the widest field of service in lithography, letterpress and folding box production.

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. . . A dream much of which has already come true — as you will quickly prove if you will turn all your printing enquiries over to "B & B Ltd." from now on.

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STARCH • CEREAL AND PULSE FLOURS • RUSKS

GUMS • ARABIC • TRAGACANTH • KARAYA

GELATINES • IN • LEAF • SHEET & POWDER

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RYE FLOUR?

Home grown and milled. Not restricted for use as a food filler. Helps to "eke out" your starch allocation and is a 100% pure food filler.

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WAR-TIME PRODUCTION DEMANDS

HYGIENIC CLEANLINESS . . .

and

. . . STERNOCLEANSE prevents dermatitis. It keeps your workpeople free from industrial skin troubles easily, quickly and economically.

STERNOCLEANSE IS NOT A "CLEANSER" - it is an antiseptic emollient cream which is rubbed into the skin before work, forming an imperceptible but impervious "glove." This effective, persistent barrier between the skin and irritating chemicals, etc., is easily removed by washing with ordinary soap and water, leaving the skin hygienically clean. Neither harsh "cleansers" nor violent scrubbing is needed.

Use Sternocleanse No. 1 for protection against paint, grease, oil, tar, filings, etc.
Use Sternocleanse No. 2 for protection against soluble oils, spirits, chemical and water-wet solutions

Sternocleanse

SKIN SCREEN AGAINST DERMATITIS

Packed in cases containing 36 tubes, 12 × 2-lb. tins, 6 × 7 lb. tins. Also in 28-lb. and 1-cwt. kegs.

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CONSIDER THESE OVERWHELMING ADVANTAGES TO FOOD PRESERVERS

- **Oranges, Lemons, Tangerines, Grape Fruits, etc., from 1⅝" to 3½" diameter cut automatically into quarters, IRRESPECTIVE of SHAPE. NO GRADING REQUIRED.**
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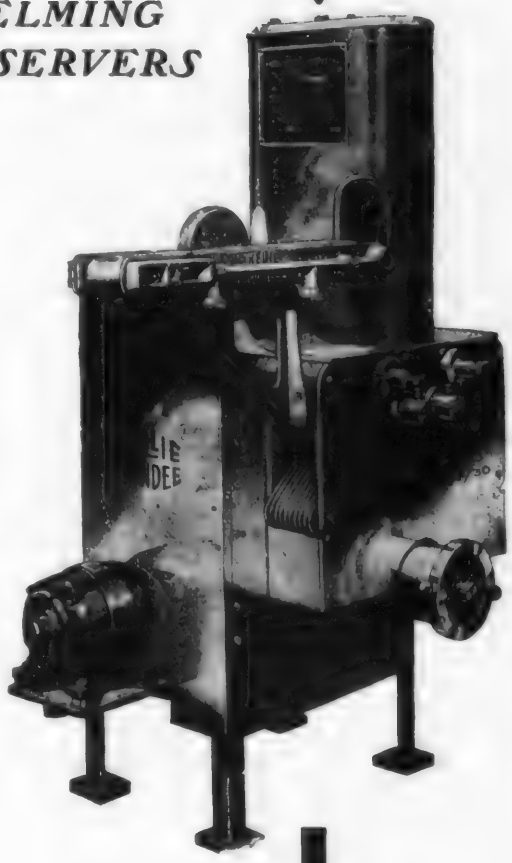
- **Peel, fruit pulp and juice are delivered separately at 12 lbs. per minute. The labour costs for this output SHOW A REDUCTION OF OVER 90% over handwork. This alone would enable the cost of the machine to be recovered in a few weeks.**
- **THE RISK OF SKIN DISEASE TO WORKERS is ABSOLUTELY ELIMINATED with this machine.**
- **All parts are of non-corrosive properties, a special acid-resisting alloy being introduced for this purpose. Arranged for direct coupled electric motor or belt drive with fast and loose pulleys.**



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Quartering, Peeling Separating & Pulping Machine

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Telephone: City Dundee (3 lines) **DUNDEE** Telegrams: "Kellie, Dundee"

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This Machine cuts Labour Costs by over 90% and pays for itself in a few weeks

Important TO ALL MANUFACTURING TRADES

Supplies are available to old and new customers

Ashex Harmless Food Colours, in Liquid and Powdered types.

Ashex Concentrated Essences, for all flavouring purposes, in Liquid and Powdered types.

Liquid and Powdered Sweetener, for all manufacturing purposes.

Bulking and Filling Agents, for most purposes.

These are only a few of the many Food Manufactures of the famous Ashe Laboratories Limited. Current Lists sent on application.

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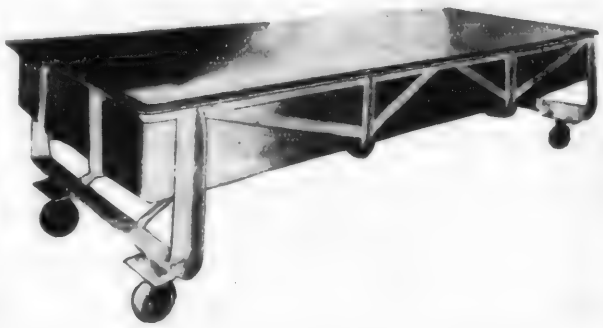
Makers of Fine Food Products since 1935

NEW ERA

. . . and then BACK TO OUR OLD JOB!

When the time comes . . . and it may be sooner than we think . . . to switch from national work to normal production, our plans are already made for immediate change-over. We look forward to renewing acquaintance with friends in the food business, producing our well-known food trolleys, wagons, bins, bakery trucks and well-known RANDALL specialities so popular in those piping days of peace.



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Upon them largely depend the accuracy, deadliness and efficiency of Britain's instruments of war. Practically all of them have to be imported across thousands of miles of dangerous seas, making heavy demands on shipping space.

Make a clean sweep of your unwanted COPPER, ZINC, LEAD, PEWTER, WHITE METAL BRASS AND BRONZE, ALUMINIUM SCRAP

The need for vast and increasing quantities of these metals must be met by a national search for everything made from them which is broken or serving no useful purpose.

WHAT TO SEARCH FOR

Here is a list of some of the important non-ferrous metal articles, parts and equipment likely to be found on your premises. Use it as a guide to your search for everything you can spare.

COPPER boilers, cable, tube, vats, wire. ZINC counter fittings, foil. LEAD pipe, sheet. PEWTER chocolate and sweet moulds. WHITE METAL solder waste. BRASS pipe, tube. BRONZE bearings, bushes, cocks, couplings, crown wheels, unions, valves. ALUMINIUM SCRAP (and its alloys), cooking utensils, foil. MONEL METAL fittings.

HOW TO DISPOSE OF IT

1 Sell your non-ferrous scrap to a Merchant.

2 Or hand it in to a Local Authority Depot.

3 SPECIAL COLLECTIONS of amounts over ONE TON may be obtained by getting in touch with the nearest Demolition and Recovery Officer. If you don't know his name, write to The Ministry of Works & Planning, Lambeth Bridge House, London, S.E.1.

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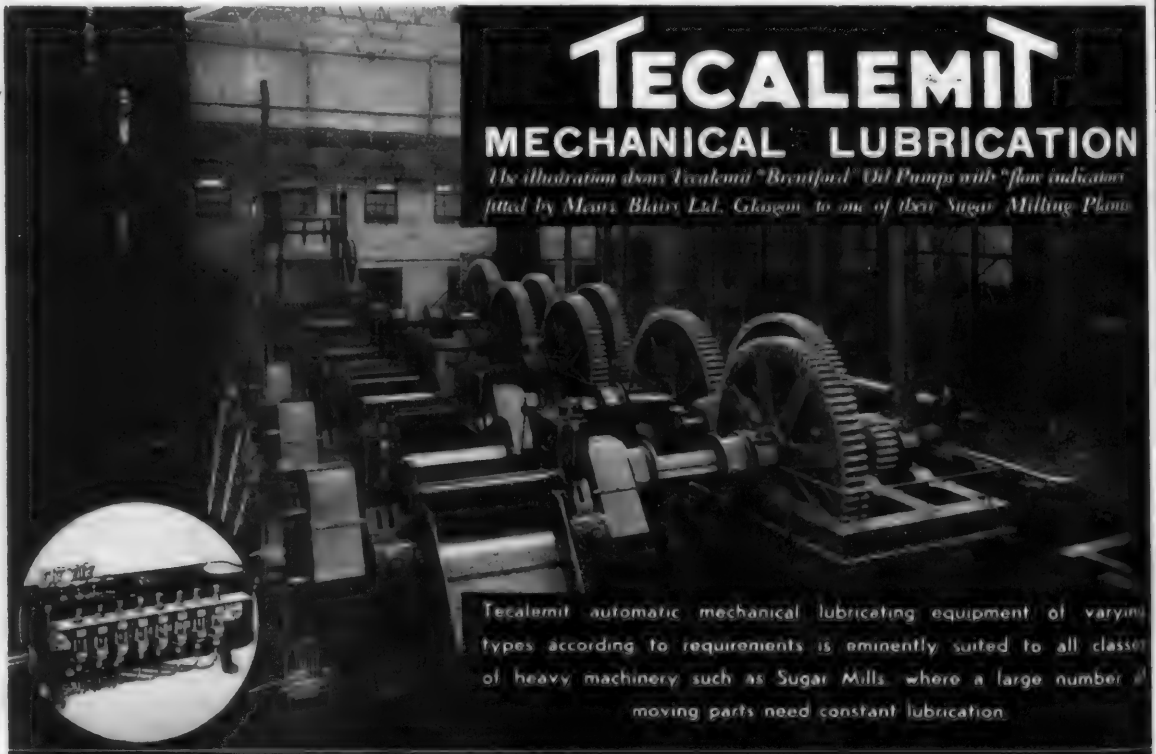

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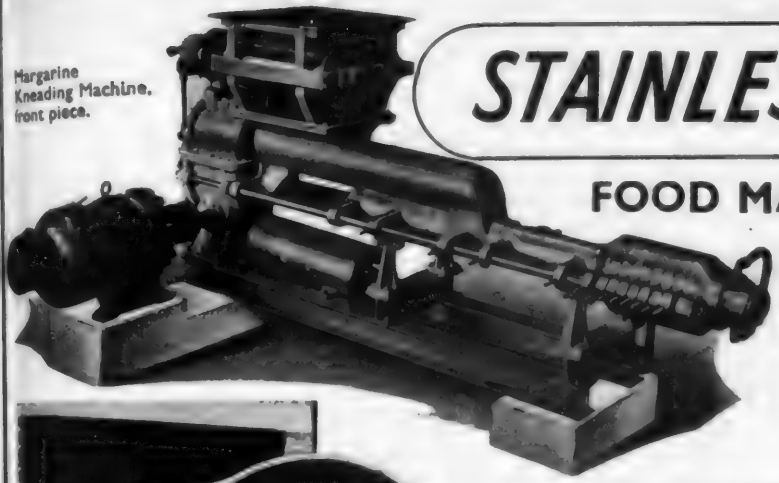

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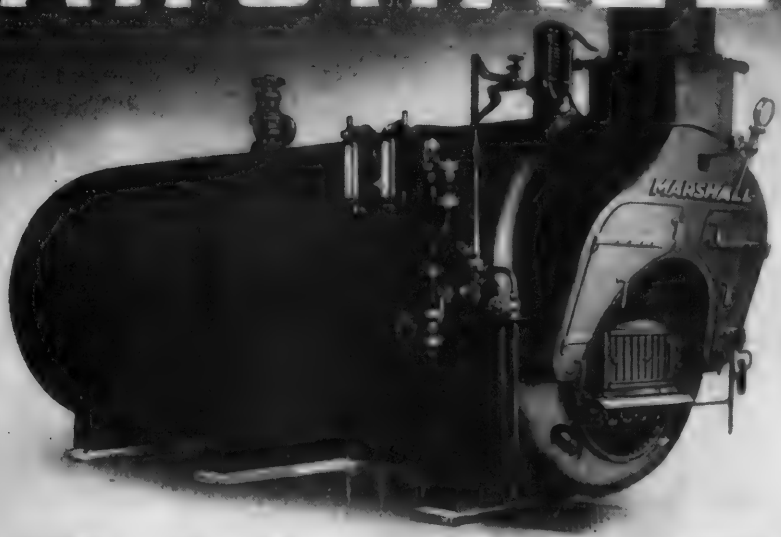

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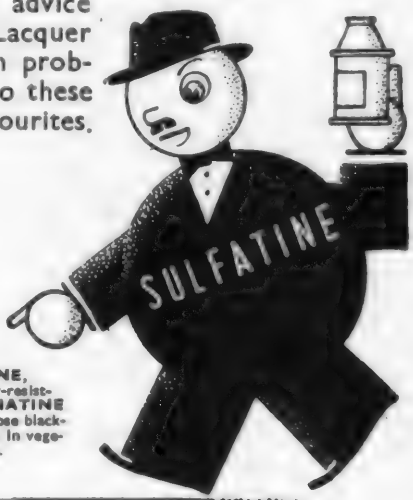

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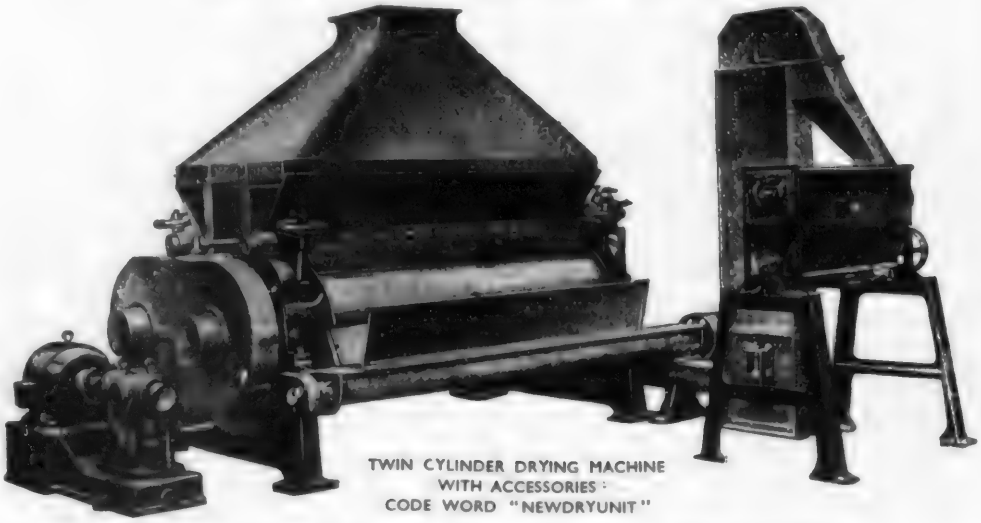

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FOOD MANUFACTURE

Vol. XVII. No. 12. Published Monthly · December, 1942

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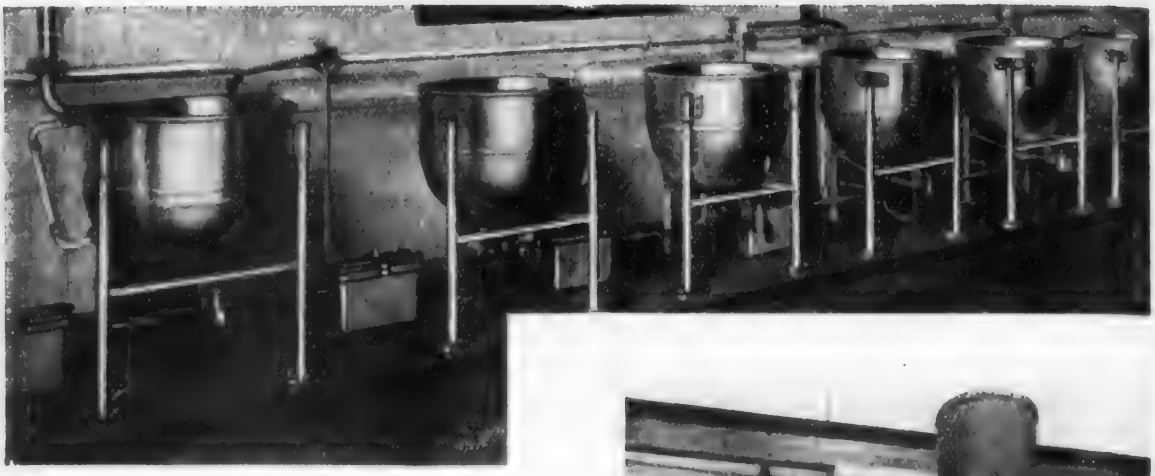

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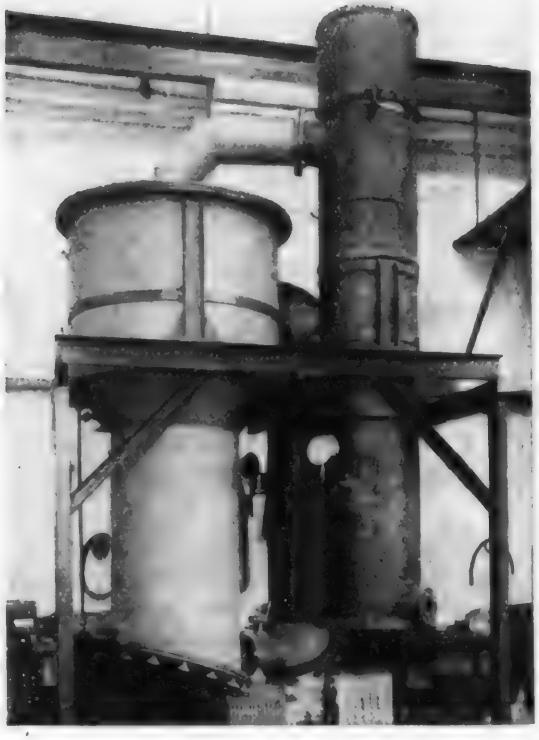

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FOOD MANUFACTURE

Vol. XVII, No. 12 December 1, 1942

Fewer Bacon Pigs

PIG production has declined so heavily during the past few months that in some quarters bacon curers are asking whether the concentration of their industry is due in greater measure to the shortage of pigs than to the man-power and fuel position!

Prices of store pigs—the raw material of the baconer—are to-day 20 to 33 per cent. below those of a year ago. Nobody wishes to buy pigs for fattening. The reason is largely because of the high cost of feedingstuffs. There is a strong belief that bacon factories are likely to receive fewer and fewer pigs until the Ministry of Food increases the prices payable to producers for them. Since pig prices were last adjusted the cost of nearly all feedingstuffs has risen, and corresponding revision of pig prices is considered to be overdue. Producers believe that the decline in pig production will not be checked until the top price is raised from the present level of 24s. per score to at least 27s. 6d., though some farmers consider 30s. per score necessary. The latter figure would give producers an additional sum of about £2 per pig, and the Ministries of Agriculture and Food have been asked to consider making such an increase. The Ministry of Food has quite recently advanced the retail prices of bacon by approximately 2d. per lb. to meet heavier costs incurred by the Ministry. It seems that any further advance in the cost of bacon pigs would have to be met by Exchequer subsidy if an additional increase in bacon prices is to be avoided.

Clean Milk

Referring to the complaint of the reduction in premiums paid for the milk of "tested" herds, Ben Davies, Director of the Laboratories of United Dairies, Ltd., in a letter to *The Times*, states that it should be realised that this system has brought so little benefit to the country that there has been no diminution in the percentage of tubercular cows during the fifty years or more the test has been known. This is not surprising. In any infectious case the first step is to isolate the sufferer. In the case of tested herds the non-reactors are segregated while the tubercular animals are dispersed by sale to other herds, with the certain result of disseminating the disease. Under those conditions the expenditure on bonuses or premiums has yielded small public advantage. The same amount of money expended on improved housing would result in economising labour, and in tending to eliminate the mass infection of calves, all of which are free from the disease at birth.

Milk production is run on a permissive "please yourself" standard of health and cleanliness. The recognition by Government of a quality test to be applied to all milk is the first approach to a saner principle. If this recognises that the standard pool price is reserved to standard quality milk, and that sub-standard milk is penalised in price, more will be done to improve production than any measure yet contemplated. The matter is also of vital importance to the economics of post-war distribution.

Salvaging Tin Cans

A four-page booklet issued by the War Production Board and Local Salvage Committees, entitled *What Shall We Do With Tin Cans?* gives official instructions of programme sponsored by the W.P.B. It consists of an appeal to the general public to salvage all tin cans and also how to prepare them for collection, and the suggestion is made to keep the leaflet in the kitchen. It is explained that all paint, oil, varnish, floor polish or cone-shaped cans are not wanted for salvage. Evaporated or condensed milk cans are not worth saving. These are to be put with trash. Coffee cans and others with painted-on can labels are wanted. Instructions are given for districts where tin can collections have been authorised by the W.P.B. Due to the present limited detinning capacity, can collections will only be made in selected cities.

These instructions are enlivened with a set of four pictures showing how a can, according to the conception of the artist, should be prepared for salvage. The first picture shows a charming young woman washing a can. She (or rather the artist who created her) evidently does not realise that water as well as tin must be economised, as she is doing the job by holding the can under a fully open tap—a method as wasteful of water as it could be! She should use a bowl. However, we have passed the leaflet to our kitchen department, with the necessary warnings.

Creameries' Longer Season

Milk production has just about reached its seasonal minimum, and it is a matter for gratification that the milk manufacturing season for civilian purposes has only just concluded. This is a sound indication of the effectiveness of the increase in production, for it means that some of the creameries have been able to enjoy a longer season than in 1941, in spite of the fact that the demand for liquid milk continues to expand. When the Ministry of Food reduced the adult "share" (Lord Woolton assures us that it is not a ration, although Mr. Tom Williams, Parliamentary Secretary to the Ministry of Agriculture, used that word in his Peterborough speech) from 3 pints to 2½ pints weekly on October 25, the "cut" was necessitated because production had fallen to a figure 8,000,000 gallons a week short of the quantity required to maintain the larger allowance. The reduction to 2½ pints left the Ministry of Food with a surplus. This has been sent to the creameries, mostly for conversion into sweetened condensed milk. Since then milk production has declined still further, milk manufacture for civilian needs has ceased, and the only manufacturing activity during the winter will be to meet Service requirements.

Before the 1943 manufacturing season opens next April the Ministry of Food, in conjunction with other Government departments concerned, will estimate the probable supply and demand next summer and will draw up a schedule showing the gallonages expected to be available for manufacture into the respective milk products. Until the schedule has been compiled it is impossible to say whether any further creameries will be closed down next season. Much will depend on the estimated production and whether the demand for liquid milk advances to new record proportions.

Food Flavourings

In America interest has always centred upon the production of new or better flavours, and it is not surprising to find that in the recent issue of the *Proceedings of the Institute of Food Technologists* (1941, 192) this subject has been discussed. The use of propylene glycol as a solvent for food flavours appears to be gaining favour despite the disgraceful behaviour of its kinsman, ethylene glycol, a year or two ago, when a number of people were poisoned, some fatally, by the ingestion of flavours dissolved in this solvent. At a time like the present, when glycerine is unobtainable, new substitutes in this field are welcome, and the granting of a clean bill of health to propylene glycol will be awaited with interest.

With regard to flavouring essences, it has been found that the seeds of the vanilla bean contain less flavour than other parts of the bean, and it is also pointed out that coumarin, used in imitation vanilla extracts, is usually employed in excessive quantities. This is, therefore, a case where a saving in raw material enhances the value of the final product. The sweetening power of glucose was found to be high in relation to that of sucrose when used in heavy syrups, but when only small amounts are required it was found that sucrose showed up to the best advantage. Sodium glutamate has long been made by the hydrolysis of wheat gluten and other protein materials, and has found a ready outlet in the manufacture of soups, gravies and "meaty" products of a similar nature, to which a small amount of glutamate will impart a rich flavour. In America millions of bushels of maize, or "corn", are processed every year to obtain starch, both for the various industries and for conversion into glucose, and one by-product has been the maize gluten. A portion of this is now being used for the manufacture of sodium glutamate so that wheat gluten can be set aside for use in special foods for diabetic patients and other uses for which wheat gluten is particularly valuable.

Trade Secrets

Having for its object the obtainment of information on a wide variety of producing and packing operations connected with foods not at present controlled, the Manufactured and Pre-Packed (Control) Order has met with some criticism from food manufacturers. The new Order calls for a return of all food products, including any article of food and drink not enumerated in the exemption schedules. It is understood that strong representations by makers of proprietary and other foods are being made to the Ministry with a view to obtaining some revision of the terms of the Order, the contention being that it reveals trade secrets and violates a basic principle of commerce.

We have sometimes wondered about the true value of "trade secrets". It was not so very long ago when a strange tribe of craftsmen inhabited food factories. They were the depositaries of deep secrets known to themselves alone. We remember the ritual which attended the operations of one of them, who locked himself in a special room to prepare a wondrous meat pickle. It was a slight improvement on previous methods, but it is questionable whether it was of much benefit to the people concerned as there were too many Peeping Toms about and the gaff was soon blown. In any case, he was only making nitrite by a roundabout method without knowing it.

We cannot think, offhand (*pace* those who have secrets we wot not of), of important aspects of food manufacture in which secrecy figures prominently. Doubtless there are many ingenious little gadgets rightly dear to the souls of their creators. Incidentally, it might be asked, if these things are

so secret how do they know that the fellow up the street hasn't got them too?

A good many years ago a well-known firm brought out a new biscuit, which earned instant popularity and is still on the market. It was commonly said that other firms would have given their heads to have found out the way to make it, and it was a considerable time before it was copied. It was probably arrived at by art rather than science, but nowadays, when food chemistry is better understood, it is doubtful whether the secret could be kept for long.

The most important secret of food manufacture is unremitting watchfulness and efficiency, resulting in that degree of standardisation which ensures uniformity. It is that sameness of quality which characterises those proprietary foods which have become household words. Any variations introduced are usually improvements on the inherent characteristics of the established product, but let there be a falling off in quality and lamentations will be heard in the sales department. It is probably easier to "put over" a good new article than to resuscitate one which has fallen temporarily by the wayside. Like the elephant, the consumer never forgets.

Determination of Tin in Foods

A distillation method for the quantitative separation and estimation of tin in foodstuffs is described by N. H. Law, M.Sc., F.I.C., in *The Analyst* for September. The outstanding advantages of the method consist in a simplication of technique, comprising an ignition to destroy organic matter, and a quantitative separation of tin by distilling from a hydrobromic acid and sulphuric acid mixture at 220° C., followed by a colorimetric estimation.

Further, the selectivity and efficacy of the separation, together with the considerable saving in time for the assay, and the improvement in the degree of accuracy, provide marked advantages over earlier methods.

The only essential difference between the proposed method and those of recent workers lies in the preliminary separation of the tin from the food. Hence, any improvement in accuracy is due not to any modification in the actual assay, which may be common to both gravimetric and distillation methods, but to the increased efficiency in the method of separation. The results from the gravimetric method are higher than those by the distillation method. However, the result obtained independently by both observers on the samples of foods examined by the new method are remarkably consistent.

To understand completely the reason for such a discrepancy between the figures obtained by either methods the limits of error operating in either case must be fully appreciated.

The Odour of Mutton

Our attention has lately been drawn to a rather obscure paper regarding the odour—which is in effect to say the flavour—of mutton. The paper in question is by Julius Schulz, a Rumanian veterinary surgeon, and it appeared in the fourth volume of the *Actes du XIV^e Congrès International d'Agriculture*. The paper is in French, with the translated title, "The Influence of Sodium Chloride on the Characteristic Odour of Mutton". Schulz begins by recalling the fame of the French *pré salé* mutton, which is derived from animals pastured within a few miles of the sea. The fine quality of the meat is not due to any special property of the race, but to some influence derived from the sea; the salt-marsh sheep lose the ability to yield their special quality of mutton if they are depastured for long in an inland region. The same phenomena have been observed in Rumania. Mutton from the Dobrogea, which lies between the Black Sea and the Danube, is invariably more tasty than mutton produced in Transylvania or in the northern part of Bessarabia. Schulz quotes a Rumanian appreciation of the Dobrogea mutton, including a remark that it is very appetising and lacks the peculiar odour that is usually associated with mutton.

Schulz points out that the vegetation of the salt marshes is typically halophytic, and then proceeds to a general disquisition on the subject of the odours of meat in general, and of chemical and culinary means that have been employed for the purpose of masking undesirable odours, such as that of goat flesh. He then describes experiments he made on the administration of common salt to sheep along with their ordinary food, which was of inland origin. After a few weeks of this salt medication during life the animals were killed and their flesh was submitted to cooking tests—both roasting and boiling. For a sheep weighing about 28 kg. a total of about half a kilogram of salt administered over a period of about six weeks was sufficient to render the meat practically odourless when cooked. This amount of salt produced some digestive disturbance in the animal, but it should be borne in mind that it was given as an intensive treatment. It seems clear that it is a continuous intake of small amounts of sodium chloride, assimilated from the grazed vegetation, which accounts for the lack of unpleasant odour in *pré salé* mutton. The *rationale* of the action of salt awaits explanation, but it is evident that the administration of common salt to sheep, especially a short time before killing, offers a simple means of improving the acceptableness of mutton to an extent such as is rarely, if ever, known to be possible by modification or treatment of other foods while they are still in the hands of the producer.

Food Packing To-day

The author briefly reviews the position of food packing after three years of war and discusses probable post-war developments.

R. L. ROWNEY.

A YEAR which has seen an intensification of U-boat warfare against the carrying lanes of the sea; which has brought new difficulties to Britain by the stoppage of important sources of raw materials; which has witnessed a substantial advance of the policy of austerity in national life; and which has found many thousand new mouths to feed in the arrival of American forces—such a year could not fail to influence food packing very appreciably.

Government Policy

It is significant that despite certain and obvious overriding preoccupations, the authorities have not allowed the many difficulties to modify their policy in the matter of food packing to a fundamental degree. The actual priority accorded to the industry is a high one, and the immediate interest of the Government has been shown, *inter alia*, by its co-operation in arranging for the adoption of new systems of preparing food for packing. Symbolic of this attitude was the collaboration between the Ministry of Food and members of the food industry, in the erection of plant for the utilisation of the new process for dehydrating vegetables and fruits. So, too, despite the acute shortage of tinplate, the quantity of canned goods available for the public has not been correspondingly reduced.

It is not difficult to account for the " protection " of the food-packing industry. With the further cut in the variety of fresh foods, the proportion of canned food in the nation's dietary has increased. Above this, the prudence of the public in laying up food, even within the purchasing limits prescribed by rationing, inevitably finds reflection in higher demand for canned and bottled products.

Fresh food can never be hard rations, for it will not keep. The insistence upon buying for storing as well as for prompt consumption has automaticallly restricted the extent to which it has been possible to overcome the accentuated shortages of the traditional packaging materials, like tinplate, for the durability of the preserved food must not be lowered. While, therefore, it would be wrong to overlook the changes which have been compelled in food packing, the relatively minor character of those changes in a period which produced some pretty compelling forces throws an illuminating light on both the importance of the industry and on the efficiency with which it had previously in the war adjusted itself to altered conditions.

The Tin Problem

Following the Japanese incursion into parts of Asia where they had no business to be, a tin problem of vast scale developed. Bolivia, the Belgian Congo, Nigeria and Cornwall are working as hard as they can, but the Democracies have been unable to reckon on supplies exceeding 85,000 tons of new tin in 1942. In 1941, U.S. used approximately 100,000 tons, while British consumption was about 30,000 tons. This meant that tinfoil and collapsible tubes had to be seriously reduced, and it meant the substitution of lead- and silver-based solders for tin solder and the replacement of tinplate by lacquered blackplate.

In the spring the Ministry of Supply issued an Order which reflected the deterioration in the position. It prohibited the cutting of plain tinplate for the manufacture of packages and crown corks for civilian use. and it covered a range of products including coffee, syrup, dried milk and milk foods, tobacco, biscuits, confectionery, oils, polishes and a list of chemists' goods. This was generally understood to be the thin end of the wedge, for about half the tin coming into the country had previously been used to make tinplate, and tin had become not only scarce but increasingly precious to the war effort.

Lacquered Blackplate

Germany, faced with a similar problem much earlier in the war, had successfully substituted lacquered blackplate for tinplate. It was not considered that Britain's tin problem would ever get as bad as that of the enemy, for substantial stocks were held, and tin production in the non-Pacific areas was as high as 71,400 tons in 1940, while the effect of the new cut in consumption was to bring the total demand of Britain down considerably. It seemed that the gap could be covered by stocks held and by increasing non-Pacific output.

The proportion of consumption affected by the substitution of lacquered blackplate in this country is about a fifth.

Manufactured and Prepacked Foods (Control) Order

In the autumn the Ministry of Food issued the Manufactured and Prepacked Foods (Control) Order, 1942, which had a dual object—to conserve food and to conserve packaging materials. This Order was a step obviously preliminary to new control measures of wide scope. It requires returns to be made in respect of every food manufactured and/or prepacked, and while it makes certain important exceptions—for instance, the packing provisions do not refer to canning processes—it is clearly an effort on the part of the authorities to secure information on which future policy could be based, and it indicates, by its scope, that new and fairly comprehensive measures are in the wind.

In the middle of October the Canning of Food and Feeding Stuffs (Control) Order came into operation, extending control by licence to cover all foods and feeding stuffs. Previously, fruit, vegetables, fish and condensed milk had been covered by canning Orders, and the completion of the range of control was an obvious and expected step. But at the time of writing no new Orders comparable in their scope to the implications of

the basic control Order have been issued, and it is difficult to forecast in what direction the authorities will turn next.

Substitution in Packing Materials

Many competent men in the industry appear to hold the view that the use of substitutes is going to receive a sudden and profound impetus, and the unprecedented development of plastics is widely held to be the secret of future food packing. It may be so. But the availability of the plastics industry has been greatly limited by the requirements of war, and at the same time the manufacturing difficulties of large-scale substitution have proved largely insuperable in conditions where the elasticity of the industry is inevitably greatly shortened. It is easy enough for the maker of breakfast cereals and similar goods to switch from white pulp-lined board to grey unlined chipboard. This aid to shipping has been effected at comparatively little inconvenience. But it is not easy for, say, a company like Heinz or Batchelor's Peas to pack its products in plastics. Considering the intensity of research in plastics during the year, and the powerful forces stimulating the use of alternative materials for packing wherever possible, it must be confessed that the progress made has not been striking.

Plastics

Comparison has been made to the utilisation of various plastics in the aircraft industry. But what scope for general adaptation to food packaging has, for instance, the paper-based "Pytram"? The commoner forms of plastics, such as bakelite, have, of course, an accepted use in packaging, but it is a restricted use, and 1942 has not yielded any basic evidence to support the opinion that a large-scale substitution process, introducing plastics for metal, wood or glass, has begun, or is even, within the limits of present manufacturing knowledge, possible.

A year ago FOOD MANUFACTURE said: "If this war is long we may find the major packing trend, which is still in the direction of simplication . . . veered to the direction of substitution. But as yet substitution has not proceeded very far." During 1942 substitution has, under the pressure of circumstances, made proportionately more, and more rapid, progress than in 1941 and 1940 put together. But the limits are still very plainly marked, and it is to be noted that even if research in plastics (or in any materials) was in fact pushed to the stage where it became possible to envisage wholesale substitution there would remain the major difficulty presented by the manufacturing set-up. It is never easy, and in these days it is particularly difficult, to reorganise the manufacturing side. It would need, as in the case of the dehydrating plant, Government backing and support.

Glass Packaging

It is also noteworthy that the spheres of can packing and glass packing have kept their separateness, although it seemed more than possible in the later stages of 1941 that a movement towards glass packaging was inevitable. For glass it can be said that it presents less difficulty in raw materials, that it is "renewable" in the sense of being readily returnable, and that its ability to maintain foods in good condition for protracted periods is not much less than that of packaging in cans.

That the underlying tendency, other things being equal, would have been towards the increased use of glass packaging is undeniable, but here again the difficulty has been one of manufacturing equipment and capacity.

The glass bottling industry has been working up to the hilt, and has had to face many problems of labour, and it has to contend with very large demands from its traditional customers—the breweries particularly. So there has been virtually no impinging on the canning industry. It remains to be seen, however, whether the added difficulties of supply which have visited the canners will give any impetus to the tendency.

For the purpose of argument, it is instructive to consider what would have happened if we had lost as high a proportion of the tin supply as we have of the rubber supply, and if it had not been easy to substitute blackplate for tinplate. Then, inevitably, there would have been a major movement towards glass packaging.

It is still possible to conceive such an intensification of the military effort, involving both a reduction in the available margin of metal for other purposes and a big cut in the volume of ship-carrying capacity for imports, that, unless the production of packed foods is to fall below stock-replacement level, a switch-over to a means of packaging which does not compete directly with the material demands of war will become necessary. In such circumstances it is a safe bet that plastics would be also-rans and that glass would have to do the job.

"Life" of Canned Foods

For some unaccountable reason there developed during the year a certain doubt in the public mind as to the security of food packed in cans. Everyone was holding back from immediate consumption as much as possible, building up a store cupboard against a rainy day, and out of the blue there came this doubt as to how long the food would keep. The Ministries of Food and Health did well to issue the necessary information; they did less well to give their estimate of the life of canned foods so cautiously. They said, for instance, that fish and meat and soups would store for five years or more. Given good storage conditions and (what can be assumed) adequate packaging, the period of conservation should be very much more than five years. So with vegetables, for which a "life" of two years was suggested.

Vegetable packs have been opened after five years and found to be perfect apart from some superficial deterioration in appearance. And one year for fruit is patently modest. Given appropriate lacquering, fruit will keep much longer, provided the external conditions of storage do not encourage rusting and the perforation of the pack. There is little doubt that the publication of this information by the Ministries, while it put at rest the more jejune fears, withdrew from private stock for immediate consumption a proportion of the reserves which had exceeded the stipulated time limit.

Wartime Influence on Post-War Industry

Statistics are hard to come by in these days when the authorities are exercising their ingenuity to prevent any useful item of news from getting into the wrong

hands. It can, however, be said with a reasonable degree of certainty that 1942 will see nearly 500 million cans of foodstuffs produced. This is a vast figure, and it is not easy to break it down because there is so little information to show what proportion of it is for the use of the Services and for the centralised storage of food and what proportion is allocated for consumption by the public. There is no room for doubt that the influences now operating over this vast range of production will have a permanent effect on the industry. This interpretation gives new validity to the desire of food manufacturers to preserve, in a world of uniformity, as much individuality as they can.

They have been concerned, in addition to the obvious and inevitable physical effects of war, about the "abstract" way in which economy in wartime has affected them.

The influence has been to reduce the attractiveness of the pack and largely to eliminate the goodwill factor, and this has led to a definite loss in recuperative advertising value. That there should be this loss does not matter at all in wartime—or, at least, matters so little as not to be important. But what does matter is the post-war period, when it will be a matter of vital importance to restore the advertising value of packing.

For a time after the war broke out there was no profound modification of the materials available for packing, and there was little restriction upon the scope for initiative in devising packs with advertising value. Early on, however, there appeared a Paper Order saying that canned goods should carry no label exceeding 20 sq. in. in area. It is, indeed, the successive intensifications of paper restriction that have dealt publicity packing its hardest blow, although other items of inconvenience have also entered into the equation.

Maintenance of Goodwill

The degree of co-operation shown by the food manufacturing industry has more than once been the subject of generous comment from official quarters, and it is true that taken as a whole the industry has played an important part in, *inter alia*, stimulating the recovery of scrap metal and of used containers of all sorts.

It would seem not an unreasonable request for the manufacturers now to ask the authorities for some co-operation in preventing the further "debasement" of packing from the advertising point of view. Inevitably, whenever the word "advertising" is mentioned in connection with branded products it must savour of sectional interest. But this is the narrow view.

The British food-packing industry has been greatly enlarged during the war and unless the post-war period is to find us with redundant capacity we shall have now to plan to divert from the home market a proportion of supplies to the export markets. This must mean, if the required degree of success is to be achieved, the maintenance during wartime of goodwill.

It will be said that the virtual standardisation of packing in Great Britain during wartime cannot possibly affect Britain's post-war competitive power in the oversea markets. But this is only true on the surface, for overseas sales are essentially, as experience has shown, an extension of domestic sales. It is the product which at home has a high reputation sustained by the distinction of its quality and of its packing that contrives to secure markets abroad. And it is plainly true that the post-war need for exports will not wait upon a prolonged switch-back process at home. Manufacturers must have everything geared ready to go when the war is finished, and it is arguable that the present trend is unnecessarily damaging to their ability to do this.

Economy—The Overriding Factor

Overriding all other considerations, of course, is the absolute question of economy. There has been substitution of materials and there may be more. There has been economy in the elimination of certain sizes of packing, and there have been economies in the virtual elimination of the decorative pack. But the question of goodwill could conceivably be decided without any appreciable prejudice to the major issue.

It must be emphasised here that there is nothing apart from the adjustments to packing that the war has introduced to diminish the goodwill of food manufacturers. That is to say, the traditional qualities of food and the varieties of food have not been adjusted to the point where goodwill is affected. What the manufacturers would welcome is permission to use a larger label. That is the crux of the whole matter.

The Packaging Standardisation Committees inaugurated by the British Standards Institute have done great work in making economies. They have reduced the variety of size of pack; they have prohibited bumped bottoms and tops of tins and deep lids; and they have convinced manufacturers of the necessity of eliminating differences between their containers.

Having gone so far, would it not be possible to add to the number of committees that now abound one styled the "Goodwill Reclamation Committee", which, with due regard to the needs of the moment, might attempt to persuade the authorities to permit a ha'porth of tar to save a shipload of goodwill?

The Future?

A word about the future. A great change has been introduced into the war position this year, and it is not surprising that at the end of it there should be much speculation as to the probable course of developments in food packing in the post-war period.

There are two schools of thought. One argues that the reaction from wartime restrictions will immediately be seen in a return to pre-war packs by the standard producers. And this argument continues that after that packaging will take on the new forms consistent with the advent of a "functional" age. Already the industry is acquainted with the prospects of artistic reform (which is indissolubly tied to the publicity factor) urged as necessary and inevitable by these spokesmen.

The other school does not believe that it will be possible to return promptly to the old packing types, and they believe that from the baseline of war packaging there will develop a largely new system, based on modern research with synthetic materials and infused with the principles of novelty. Their case is that experiment in the war has indicated possibilities which the shortages caused by war have prevented from being realised, and that with the removal of restrictions the chicken will be rapidly hatched.

Exploitation of New Knowledge

Probably the truth is between the two. There is no doubt that manufacturers generally are reckoning on restoring as soon as possible the packages which sus-

tained their goodwill in pre-war days. Nor is this an attitude which is antagonistic towards the utilisation of the new knowledge gained under war compulsion. On the other hand, it is impossible to rule out of reckoning the really remarkable potentialities of recent developments in packaging materials, whose influence on food packing has come to stay. More, however, than questions of this sort, the fundamental problem is whether standardisation is to be continued or strongly reacted against. Here we have to distinguish between the two aspects of standardisation. In so far as the term implies compliance with the requirements of the Ministry of Food, and connotes laboratory control, standardisation has surely come to stay in the full sense. But in so far as the effects of standardisation are apparent in the visual sense, it is difficult not to believe that the reaction will be strong and immediate. It may be true that the development of food packaging and the full use of research will be retarded by the automatic desire to get back to the old forms, and to rediscover the individuality which still figures in balance-sheets as a considerable item. But it seems unlikely that the industry will deliberately adopt a policy which ignores the big potentialities opened up, and not at all fully explored, by wartime laboratory experiment.

Anti-Vitamins

DR. KATHARINE H. COWARD.

IT is many years since Mellanby[1] postulated the existence of toxamins, in particular of an anti-calcifying toxamin. He had found that oats, wheat and rice in the diet of dogs had a rachitogenic effect, and at first it seemed that this effect was related to the more rapid growth of his dogs, a factor which had always been regarded as favourable to the development of rickets. However, it soon became evident that the three foods, oats, wheat and rice, varied in their rachitogenic potency, oats being the most potent and rice the least, but further investigation showed that two days autolysis decreased the potency and that treatment with hydrochloric acid destroyed it; yet the dogs grew just as fast. Moreover, giving vitamin D or extra calcium to his dogs neutralised the effect of the cereals..

Phytic Acid

The story became more complicated by Steenbock's[2] and Bruce and Callow's[3] finding that much of the phosphorus of an animal's diet is unavailable, but this did not explain the beneficial effect of additional calcium on Mellanby's dogs. Eventually, Harrison and Mellanby[4] found phytic acid in all the rachitogenic cereals, in the greatest amounts in oats and in smaller amounts in wheat and rice. Phytic acid, inositol hexaphosphate, combines not only with the calcium present in the cereal, but also with the calcium in other food eaten at the same time. The calcium phytate so formed is insoluble, and is excreted in the fæces. Only the calcium which remains after all the phytic acid has been satisfied is available for the body's needs. Thus phytic acid may certainly be regarded as an anti-calcifying factor, a toxamin or an anti-vitamin.

Anti-Vitamin A

Mellanby[5, 6] has also postulated the existence of a substance which may antagonise the action of vitamin A. He found that dogs given a diet containing large amounts of cereals and very little vitamin A developed degeneration of the cord and various other nerves, and further investigation showed that the degeneration was accompanied by overgrowth of bone and pressure on the nerves. Substituting potatoes for the cereals in the diet lessened the effect, and it is unlikely that the amount of carotene in potatoes would account for their action. It is at least possible that cereals contain a substance which antagonises the action of vitamin A.

Biotin

Another puzzle has lately been at least partially solved. It was known for many years from the work of H. T. Parsons and her colleagues that egg-white contains some substance harmful to the nutrition of the rat and that various food substances contain something which neutralises this effect. This substance was tentatively called vitamin H. Recently György and his co-workers and Williams and his co-workers in a joint publication[7] have expressed their opinion that vitamin H (or biotin) is necessary for nutrition, and that egg-white contains a substance, albumin-like in nature, which they call avidalbumin or avidin, and that it combines with vitamin H, thus preventing it from being absorbed and carrying out its so far unknown function in the animal body.

It is not really surprising that anti-vitamins exist; considering the chemical nature of the vitamins (even varied as it is) it would be more surprising if it were otherwise.

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Recent Developments of the Resazurin Test—Part II

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Preparation of Resazurin Solutions

IT HAS been our custom at the N.I.R.D. to dissolve 100 mg. of the Eastman or National Aniline product in 200 ml. distilled water, steam for ½ hour, and thereafter withdraw the solution aseptically as required. This stock 0·05 per cent. solution is kept in the refrigerator or at room temperature, and appears to be quite stable. Autoclaving of the solution appears to result in a slightly faster reduction at the last stage of disc 1→0. We never take the risk of using the 0·005 per cent. bench solution after the day of preparation, although the straight solution (not prepared from tablets) would probably keep for some days in the refrigerator. Resazurin itself is stable in sunlight, but it is advisable always to keep solutions in the refrigerator when not in use. The solution is weakly alkaline (see data in Table 4).

Tablets

Some time ago Bengers, Ltd., undertook the marketing of resazurin tablets at our request, and these have proved a great boon to the smaller dairies. The tablets contain lactose, and so the solution must be used within a few hours of preparation, and must on no account be exposed to sunlight. Boots Pure Drug Co., Ltd., are now also putting tablets on the market, and we maintain close contact with both these firms for the purpose of ensuring a satisfactory supply of resazurin. Bengers, Ltd., also market rennet tablets for use in the resazurin-rennet test.

The Resazurin Comparator

This was designed in collaboration with Mr. G. S. Fawcett, of Tintometer, Ltd., and Mr. S. B. Thomas, and although the matching of colours by reflected light is a problem that cannot be solved as satisfactorily as matching with transmitted light, the comparator is a practicable apparatus that has put the test on a quantitative basis, and avoided the uncertainty of reproducibility over the question of "purple-pinks", etc. Actually, any observer who is constantly using the test can record the colours subjectively within fairly satisfactory limits. Table 5 shows the results of a test carried out on the author soon after the comparator was standardised.

Hints on Using the Comparator

1. *Control Tube.*—For all ordinary Shorthorn and mixed Shorthorn-Friesian milk, which forms the bulk of our supply, it is sufficient to use a control of bulk milk. If very "thin" Friesian or highly pigmented Guernsey or Jersey milk is under test, special controls should be used.

2. *Glassware.*—If the test tubes for control and test samples are of differently coloured glass—*e.g.*, one bluish and the other yellowish—difficulties in matching may occur. It is advisable, therefore, to watch this point.

3. *Lighting.*—We prefer to face the comparator to a white wall or surface in a north room or at any rate in a room not containing direct sunshine. The use of the comparator with the light from a setting sun coming transversely across the comparator will result in very difficult conditions for matching.

4. *Activating Effect of Sunlight.*—Direct incidence of sunlight on milk containing resazurin may give a marked production of resorufin in a very short time. Extreme care must be observed to avoid this source of error.

5. *Daylight Lamp.*—It is frequently impossible to use daylight in creamery laboratories and on the platform. Tintometer, Ltd., have, at our request, designed a simple and cheap form of daylight lamp especially for use with the comparator.

6. *Possible Confusion between Discs 2 and 1−.*—The colours at disc 2 and just below 1 (1− or ¾) are very similar and can be confused by the inexperienced or by persons with poor colour perception. When in doubt, the safest thing is to hold the tube for a little longer. If the colour changes to a deeper pink, the original was 2; if to ½ or 0, then 1−. A useful hint is to take out the tube and hold it against a white background, when the blue component of disc 2 is made more obvious.

Test for Colour-Blindness

It is obviously desirable that users of the comparator shall have normal colour sense. The Ishihara test is widely recognised, but copies are now scarce. Our own data on this point indicate that about 9 per cent. of men are completely or partially green-red blind, the percentage of women being very small. So far I have found only two laboratory workers in sixty to be colour-blind. This point should be checked, however, by those responsible, and a simple method is to cut a number of strands of differently coloured wool in half and ask the test subject to name and match the strands.

The Standard or 1-Hour Test

There is a general agreement amongst workers that the 1-hour test is most suitable for routine grading,[8, 9, 10]

TABLE 4

Sample.	*Age.*	pH.	*Titratable Alkalinity.* *ml. N/10 acid per 10 ml. 0·05% soln.*
Eastman	1 month	9·15	0·35
Baker	,,	8·22	0·38
Benger	Fresh	9·26	0·21
Boots	3 days	8·28	0·20

TABLE 5

Subjective Grading.	*Disc Numbers.*												
	6	5½	5	4½	4	3½	3	2½	2	1½	1	½	0
No change ..	21	4											
?	1	15	21										
Lilac				11	3								
Mauve					3		1						
Pink mauve ..					2	1	1						
Mauve pink ..								1	4				
Pink													
White													

although Davis and Thiel in 1939 suggested 2 hours for good milks,[11] and Johns and Howson have described a triple-hour test.[12]

Experience has shown that the resazurin test, like the methylene blue, is very sensitive to temperature, and so the seasonal effect is large. A criticism has been voiced at one or two creameries that the 1-hour resazurin test fails to pick out dirty milks in winter. Examination of the records shows that this is true, but it is also true of the methylene blue test. In general, the results in creameries throughout the country show that both dye reduction tests keep closely together, the plate counts having a wide spread at all levels of the dye tests.

It is obvious, therefore, that some form of temperature compensation has to be applied if the test is to be of the greatest use. Let us consider the factors which are responsible for the seasonal differences. These are :

(*a*) The more rapid growth of bacteria at higher temperatures.

(*b*) The heavier contamination for a given amount of milk residue in summer.

(*c*) The higher proportion of souring and reducing organisms in the flora in summer.

(*d*) Differences in bacterial nutritional value between winter and summer milk.

(*e*) The higher " potential " of bacteria in warm weather as shown by the shorter lag period.

(*f*) The higher proportion of bacteria growing at higher temperatures, especially 37° C., in warm weather.

What is to be Measured ?

With this background we have to ask the question, " What is it we wish to measure? Is it total bacterial numbers, or conditions of production, or conditions of production *and* handling, or keeping quality, and, if the last, under what conditions and for what purposes? Or do we wish to grade down a given percentage of producers?" Even if we could decide on one of these, we have no fundamental yardstick for assessment of the various tests. For example, the Gerber and other fat tests can be assessed in terms of the Adams or Röse-Gottlieb method, but in no single case can we assess the accuracy of any bacteriological method by a cast-iron standard. If we wish to measure total bacterial numbers with the greatest possible accuracy, we have no option but to return to the plate count or adopt the direct microscopic count. If, however, we are primarily concerned with keeping quality, then a dye reduction test at low temperatures is obviously indicated.[13] The emphasis nowadays is on keeping quality, and for this reason I feel that the test of the future is the resazurin test, either at 37° C. or 18° C., with possibly an extra storage period of 16 to 24 hours at 18° C. before testing in the winter.

Summing up, we may say that with the resazurin test we endeavour to measure a multiple complex of the bacteriological and hygienic condition of the milk.

This complex is weighted in the following order :

1. Souring and reducing organisms, especially coli-aerogenes types, streptococci and staphylococci.
2. Other bacteria.
3. Cells (due to bad mastitis).

Of these three factors the first is easily the most important, and the last has the least effect on the test. Non-souring bacteria are important because they often produce taints or other faults such as " sweet curdling ", and, although they may not sour milk themselves, they may accelerate souring by stimulating acid-forming organisms. From a practical point of view, therefore, the resazurin test is a most useful one.

Temperature Compensation Systems

On the question of temperatures or seasonal compensation for dye reduction tests we have three methods available :

1. Adjustment according to the month of the year, as in the Accredited Scheme (5½ hours from October to April and 4½ hours from May to September),[14] and also in the experimental Ministry of Food Scheme, where a more gradual adjustment was attempted.

2. Alteration of time of incubation according to the minimum night temperature following production.[15]

3. Alteration according to the mean atmospheric shade temperature of the 24 hours following production, as illustrated in Table 6.

The question will naturally be raised as to what evidence these temperature compensation systems are constructed upon. It must be admitted that clear-cut evidence for any one system cannot be brought forward. The general problems of the bacteriological grading of milk involves both the *process* or *procedure* and the *purpose*; scientific method can only hope to answer the first question, and for the second we must rely on practical experience and theoretical considerations incapable of formal proof. For example, a rigid standard, say, of disc 0 in 1 hour at 37° C. would grade down

TABLE 6

DAVIS AND THOMAS (1942).

Mean Atmos. Shade Temp. (°*F.*).	*Time of Incubation at 37° C.*
40 and under	120 mins.
41–50	90 ,,
51–60	60 ,,
61–65	30 ,,
Over 65	15 ,,

about 1 per cent. in very cold weather and 50 per cent. or more in very hot weather. The advisory side of any scheme must be taken into consideration in formulating the standards, and it is generally agreed that we must frame a scheme so that we can detect and improve in winter those producers who will give trouble in summer. Table 7 gives the data obtained by Mr. S. B. Thomas in Carmarthenshire this year, and arranged according to mean atmospheric temperatures. These figures show that only 0·1 per cent. of producers' milks reduced methylene blue in ½ hour when the mean temperature was below 40° F., but 45 per cent. did so when the temperature was over 70° F.

Mastitis as a Cause of Failure in the Resazurin Test

There is no possible doubt that a high cell content adversely affects the grading of aged good quality milk by the resazurin test, but not appreciably that by the methylene blue. On the basis of this observation Davis and Thomas attempted to work out two formulæ which, given the results of resazurin and methylene blue tests, could evaluate both the numbers of bacteria and cells. We obtained the formulæ, which were, of course, based on average values, but the error of the method was so high that we considered that such formulæ would be misleading.

The cells in milk can readily reduce resazurin to resorufin, but not resorufin to dihydroresorufin. Indeed, freshly drawn mastitis milk (subclinical) high in cells can only temporarily partially reduce methylene blue, the colour returning on inversion of the tube, and the final reduction time being many hours.[16] Therefore, while mastitis can lower a disc number over the range 6 to 1, it cannot cause complete reduction, and therefore cannot result in a producer having his milk returned to him. It can, however, produce a slight lowering of the grade in the standard test. It may seem at first sight unfair to penalise or grade down a producer for mastitis, which is commonly stated to be outside the farmer's control. We should remember, however, that the consumer pays a good price for milk and is entitled to a good product. There is no justification for his being palmed off with a saline suspension of cells spiced with toxin-producing staphylococci and possibly pathogenic streptococci. Taking the long-term view, therefore, we feel that the general adoption of the resazurin test for routine grading would be a very important factor in making the producer "mastitis-conscious". The few experiments that we have been able to carry out indicate that the ordinary subclinical mastitis, as detected by the resazurin-rennet test on single quarter or cow samples, has no significant effect on either the 10-minute or the 1-hour test with high-count milks when the milk is aged 24 hours.[17] Milk from clinical tests (clots, discoloration, blood, etc.) usually affects the result, but this is highly desirable.

Contradictory Results

We have noticed in laboratory records that on some occasions the resazurin and methylene blue results may be very contradictory—*e.g.*, methylene blue reduced in 1 hour, resazurin disc 5 in 1 hour, or resazurin disc 0 in 1 hour and methylene blue reduced in 5 hours. We have not ourselves met with such violent contradictions, although milder discrepancies occur, and we should bear in mind that mistakes in labelling and recording are always possible. It is suggested, therefore, that whenever such gross discrepancies occur, the tests should be repeated if possible. The few cases that we have been able to check ourselves were all due to mistakes, the check test showing reasonable agreement between the resazurin and methylene blue tests. These errors are chiefly due to creamery laboratory staff being required to do a number of tests on many samples of milk. An improvement would be effected by discontinuing those tests of little value for producers' milks, such as acidities and sediment tests, and doing a limited number of tests properly.

Application of the Test to Stored Bulk Milk

Certain features of bulk milk may considerably alter the relationship of resazurin reduction time to bacterial numbers. These are:

1. More standardised flora.
2. More uniform cell count.
3. Oxygen tension.

The first two points are obvious and need no discussion, but the third has to be considered with care. All dye reduction tests depend fundamentally on the oxygen tension of the milk. For producers' milk in 10-gallon churns subject to the usual agitation, sampling and shaking in bottles or tubes, it is safe to assume that aeration is standardised. For bulk milk in depth with variable ratios of milk volume to air space and different times of holding (18 to 36 hours) conditions are obviously different. It is necessary,

TABLE 7.

METHYLENE BLUE REACTION.

FREQUENCY DISTRIBUTION ACCORDING TO ATMOSPHERIC TEMPERATURE.

(Thomas, 1942.)

(*January* 1 *to July* 31, 1942.)

Series Nos.	*Mean Atmospheric Temperatures. ° F. 9 a.m.*	*Samples Examined.*	*Percentage Distribution of Methylene Blue Reduction Times.*					
			6+	4½-6	3-4	1½-2½	½-1	½
1 ..	35-40	3,992	88·0	8·0	2·5	1·2	0·2	0·1
2 ..	41-45	4,221	68·7	13·3	6·8	6·7	3·5	1·0
3 ..	46-50	11,933	69·7	12·2	7·0	6·1	2·9	2·1
4 ..	51-55	17,534	43·5	16·2	10·9	13·9	10·8	4·7
5 ..	56-60	5,875	29·8	15·2	10·4	18·4	16·4	9·8
6 ..	61-65	3,710	19·3	11·8	11·6	17·1	20·0	20·2
7 ..	66-70	909	13·3	12·3	7·7	13·9	22·4	30·4
8 ..	over 70	276	6·8	5·7	7·0	17·1	18·1	45·3

therefore, to standardise the aeration—*e.g.*, by shaking a given volume a given number of times under standardised conditions. Since the first stage of resazurin reduction is irreversible we may expect resazurin to be less dependent on the oxygen tension than methylene blue. The resazurin and dissolved oxygen may be regarded as competing substrates for the reducing enzymes of the bacteria.

The Resazurin Test at 18° C.

This was described by Davis and Watson this year,[18] and its value cannot be assessed until further work has been done upon it. There is a close relationship between the resazurin and the methylene blue test at 18° C. and 15·5° C.,[19] which latter has been shown by Hiscox *et al.*[13] to be closely related to keeping quality. As resazurin at 18° C. gives a result in about 3 hours, the test seems to have possibilities as a measure of keeping quality. B. F. Thomas has obtained a somewhat lower ratio for the relation of times of reduction at 18° C. and 37° C.[20]

The Rapid (10-Minute) Resazurin Test[21, 22]

This has been shown to be the most accurate quick test for sorting out bad milks on the platform.[23, 24] Practical objections to the test are really due to the trouble and time involved in taking the sample to the laboratory. We have therefore suggested a trolley laboratory for the platform which permits the carrying out of this and other tests on the spot.[25] It may be mentioned that mastitis will help to up-grade a milk on the usual titratable acidity and *p*H tests, but will, if anything, down-grade a milk on the resazurin test.[26]

This test has been provisionally adopted as the official platform test by the Ministry of Agriculture, disc 4 to 6 milk being accepted, 3½ to 1 placed in the "salvage" category and ½ to 0 rejected.

The Resazurin-Rennet Test[27]

This is the most difficult of all the resazurin tests to interpret, largely due to the ambiguous use of the term "mastitis milk". The rennet test merely measures the rate of clotting with rennet—*i.e.*, it is controlled by *p*H and to a less extent by the "globulin + albumin : casein + calcium" ratio. It has never been claimed that it can be used to detect *Str. agalactiæ* even in single cow milks, least of all in herd bulks. From the point of view of the manufacturer, however, it is the *chemical* abnormality which is important; as far as we know, *Str. agalactiæ* in itself is of no significance to the cheesemaker or manufacturer of condensed milk. The resazurin-rennet test is therefore of most use to the manufacturer, and in our experience about 1 per cent. of producers' milks are so abnormal chemically that they should be rejected on this ground alone.[28] The test gives very clear-cut results with single quarter samples, and is very useful for picking out the badly infected cases and getting a general idea of the incidence of the disease in a herd.[29] When such samples are tested immediately after milking, the resazurin test is a measure of cells in the milk; when applied to bulk herd milk at 24 hours old, however, it is a measure of bacterial numbers. This is because bacteria are negligible in freshly drawn milk and the cells are fresh and active. In aged bulk milk the bacteria are numerous and the cells less variable in numbers and stale—*i.e.*, of reduced activity.[30, 31]

The Resazurin Test for Pasteurised Milk

This has been tried by some workers with some success. Rowlands and Provan[32] reported that the test at 37° C. did not correlate well with other tests, but the test at 63° C. detected all milks with counts at 63° C. in excess of 300,000.

Davis and Newland[28] have shown that the resazurin test (2 hours at 37° C.) can be used to detect gross errors in pasteurisation, a disc reading of less than 6 indicating a faulty technique when bulk milk of ordinary commercial quality in summer is under treatment.

The Resazurin Test for Sterility of Churns and Bottles

Thomas in 1941[33] described a method for testing sterility of churns by this test, and claimed reasonable agreement with the plate count. Davis and Watson[34] have modified the method in an attempt to get better matching and a more convenient test. They recommend adding 1 ml. of rinse to 10 ml. sterile separated milk, holding at 22° C. for 24 hours and then making a 30-minute resazurin test at 37° C. Disc 4 or less fails.

These workers have failed to get reasonable agreement between a resazurin test and the plate count in the case of bottles, and this is presumably due to the different type of flora in bottles, poorly reducing types being more prominent.

Comparison with the Methylene Blue Test

It is obvious that for routine grading the choice lies between the resazurin and the methylene blue tests. The advantages of the resazurin test may be summarised as follows:

Adaptability and Flexibility.—Probably no other test can be compared with the resazurin test for adaptability. It can be used as a rapid test on the platform, for routine grading, in combination with the rennet test, for sterility of churns, and, doubtless, further modifications will be devised. Both the end-point (disc reading) and the time of incubation can be varied at will, and this fact endows the test with enormous flexibility.

Simplicity.—Only one reading—*e.g.*, after 1 hour—is required, compared with 6 to 12 readings in the methyline blue test, requiring up to 6 hours.

Testing on same Day as Sampling.—The 1-hour test can be carried out from 4 to 5 p.m. on the day of sampling, thus avoiding refrigeration overnight, which has a variable effect and generally allows bad milks to deteriorate.

Sensitivity to Weakly Reducing Organisms.—A milk rich in weakly-reducing organisms usually affects resazurin, but may fail to reduce methylene blue for many hours.

Sensitivity to Mastitis and other Cells.—A high count of cells, whether due to mastitis, late lactation or colostrum, is disadvantageous in milk for many reasons. Resazurin, but not methylene blue, is affected by large numbers of cells in aged milk.

Relation of Result to Initial Flora.—In a short-time test the result is more likely to bear a relation to the initial flora than in a longer test, especially in cold weather.

Contamination in Sampling and Testing.—Any contamination will naturally influence a short test less than a long test.

Use as a "Methylene Blue Test."—If desired, the test can be prolonged to complete reduction of the dye, so that it becomes for all practical purposes a methylene blue test, but requires about ½ hour longer.

Uniformity.—The advantage of standardising as many tests as possible fundamentally on one technique, such as the resazurin test, will be obvious.

Acknowledgments

The writer gratefully acknowledges the collaboration of Dr. C. C. Thiel, Mr. R. S. Twigg, Mr. P. B. Kunckey, Mr. D. W. Watson and Mr. L. G. Newland in much of the work discussed in this article. He is also indebted to Dr. W. Baker, Mr. W. G. Leeds, Dr. W. F. Short, Mr. P. Oxley, Dr. A. E. Gillam, Dr. Elvidge and Mr. S. B. Thomas for permission to quote unpublished results.

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[4] Thornley and Hilton (1942), *Private communications.*
[5] Davis and Thiel (1939), *Unpublished data.*
[6] Twigg (1942), *Private communication.*
[7] Wilson *et al.* (1935), *Med. Res. Counc. Spec. Rep. Ser.* No. 206.
[8] Ramsdell *et al.* (1935), *J. Dairy Sci.*, **18**, 705.
[9] Davis (1939), *Food Manufact.*, **14**, 196.
[10] Thomas and Davies (1940), *Welsh J. Agri.*, **16**, 231.
[11] Davis and Thiel (1939), *Proc. Soc. Agric. Bact.*
[12] Johns and Howson (1940), *J. Milk Tech.*, **3**, 320.
[13] Hiscox *et al.* (1932), *J. Dairy Res.*, **14**, 105.
[14] Anon. (1937), Memo 139/Foods, Min. Health.
[15] Davis and Rowland (1941), *Food Ind. Manual*, p. 157.
[16] McClemont and Davis (1939), *J. Dairy Res.*, **10**, 88.
[17] Davis and Newland (1942), *Unpublished data.*
[18] Davis and Watson, *Milk Ind.* (1942), Feb., p. 37.
[19] Davis, Golding, Hoy, Knuckey, Jones, Lawes, Newland and Twigg (1940-41), *Unpublished data.*
[20] Thomas, B. F. (1942), *Proc. Soc. Agric. Bact.*
[21] Davis (1939), *Dairy Ind.*, **4**, 221.
[22] Davis (1942), *Milk Ind.*, June p. 31.
[23] Barkworth *et al.* (1942), *Proc. Soc. Agric. Bact.*
[24] Thomas, S. B. (1942), *ibid.*
[25] Davis (1942), *Dairy Ind.*, **7**, 151.
[26] Davis (1941), *Food Manufact.*, **16**, 133.
[27] Davis (1939), *Dairy Ind.*, **4**, 421.
[28] Davis and Newland (1941), *Unpublished data.*
[29] Davis (1942), *Vet. Rec.*, **54**, 145.
[30] Davis and Knuckey (1941), *Unpublished data.*
[31] Thomas, Probert and Morgan (1941), *Dairy Ind.*, **6**, 323.
[32] Rowland and Provan (1941), *Proc. Soc. Agric. Bact.*, p. 36.
[33] Thomas (1941), *Proc. Soc. Agric. Bact.*, p. 47.
[34] Davis and Watson (1942), *Unpublished data.*

APPENDIX

LIST OF RESAZURIN REFERENCES

(In chronological order, 1929 to September, 1942)

No.	*Author.*	*Year.*	*Journal.*	*Subject.* (R. = resazurin. M.B. = methylene blue.)
1.	Pesch, K. L., and Simmert, U.	1929.	Milchw. Forsch., **8**, 551.	R. first introduced.
2.	Walbauer	1931.	Rep. Hung. Agric. Exp. Sta. (Kis. Köz.), **34**, 128.	Count and R. reduction.
3.	Mundiger, E., and Wolff, E.	1933.	Molkereiztg, Hildesh., No. 47, 171.	R. useful for poor milks.
4.	Demeter, K. J., and Forg, J.	1934.	Molkereiztg, Hildesh., No. 32, 3.	R. and M.B. comparison.
5.	Ramsdell, G. A., Johnson, W. T., Jr., and Evans, F. R.	1935.	J. Dairy Sci., **18**, 705.	General R. classification of milk.
6.	Ramsdell, G. A.	1936.	Rep. N.Y. St. Ass. Dairy and Milk Insp., **10**, 57.	General R. classification of milk.
7.	Moldavan, A.	1936.	Canad. Dairy Ice Cr. J., **15** (7), 21.	R. and M.B. correlation.
8.	Barrett, W. D., Rutan, H., and Keenan, J. A.	1937.	J. Dairy Sci., **20**, 705.	R., M.B. microscopic count.
9.	Fay, A. C.	1937.	J. Milk Tech., **1** (1), 6.	R. problems to be tackled.
10.	Keenan, J. A., Barrett, W. D., and Rutan, H.	1937.	J. Milk Tech., **1** (1), 22.	Same as No. 8.
11.	Ramsdell, G. A.	1937.	Milk Dlr., **27** (2), 90.	R. and M.B. abnormal milk.
12.	Fay, A. C.	1938.	Food Res. **3**, 245.	Same as No. 9.
13.	Frayer, J. M.	1938.	Bull. Vt. Agric. Exp. Stat., No. 435.	M.B., R. plate, cells, sunlight, etc.
14.	Moir, G. M.	1938.	N.Z. Dairym., **43** ((3), 55.	R. on cream.
15.	Moldavan, A.	1938.	Milk Pl. Mon., **27** (10), 58.	R. various.
16.	Nelson, F. E., and Foltz, V. D.	1938.	Rep. Kans. Agric. Exp. Sta. (1936-8), p. 89.	R. and leucocytes.
17.	Prouty, C. C.	1938.	Proc. Inst. Dairying, Wash. **11**, 72.	R., M.B., plate and microscopic count.
18.	Strynadka, N. J., and Thornton. H. R.	1938.	J. Dairy Sci., **21**, 561.	M.B., leucocytes, and "other reducing substances".
19.	Keenan, J. A., Barrett, W. D., and Rutan, H.	1938.	Milk Pl. Mon., **27** (3), 32.	R. general milk and cream.
20.	Thomas, S. B.	1938.	Abstr. Proc. Soc. Agric. Bact., p. 26.	R. and M.B. comparison.
21.	Collins, M. A., *et al.*	1939.	Ass. Bull. (Int. Ass. Milk Dlrs.), **31**, 104.	R., M.B. and direct count.

No.	Author.	Year.	Journal.	Subject. (R. = resazurin. M.B. = methylene blue.)
22.	Collins, M. A., *et al.*	1939.	J. Milk Tech., **2**, 236.	R. and M.B. correlation.
23.	Davies, J., Thomas, B. F., and Thomas, S. B.	1939.	Welsh J. Agric., **15**, 181.	R. and M.B.: factors affecting R. at 15° C.
24.	Davis, J. G.	1939.	Dairy Industr., **4**, 221.	R. at 45° C.
25.	Davis, J. G.	1939.	Dairy Industr., **4**, 421.	R. —rennet.
26.	Davis, J. G., and Thiel, C. C.	1939.	Abstr. Proc. Soc. Agric. Bact., p. 35.	R. and M.B. observations.
27.	Gunderson, M. F., and Templeton, H. L.	1939.	J. Bact., **38**, 483.	CO_2 and R.
28.	Johns, C. K.	1939.	J. Milk Tech., **2**, 175.	R. and M.B. correlation.
29.	Johns, C. K.	1939.	Amer. J. Publ. Hlth., **29**, 239.	R., M.B. and cell count.
30.	Nelson, F. E.	1939.	J. Dairy Sci., **22**, 335.	Different R. brands compared.
31.	Russell, R. R., Palmer-Jones, T., and Moir, G. M.	1939.	N.Z. J. Sci. Tech., Sect. A, **21**, 161A.	R. and mastitis diagnosis.
32.	Johns, C. K.	1939.	Canad. Dairy Ice Cr. J., **18**, (5), 27.	Hourly inversion and R. reduction.
33.	Davis, J. G.	1939.	Food Manuf., **14**, 196.	Standard 1 hr. test and general.
34.	Brannon, J. M.	1940.	Milk Pl. Mon., **29** (5), 51.	R. and plate count.
35.	Chilson, W. H., and Collins, M. A.	1940.	J. Milk Tech., **3**, 334.	R., plate and keeping quality on cream.
36.	Davis, J. G., and Thomas, S. B.	1940.	Dairy Industr., **5**, 244.	R. comparator.
37.	Davis, J. G.	1940.	Dairy Industr., **5**, 18.	Review of R. work.
38.	Johns, C. K., and Howson, R. K.	1940.	J. Milk Tech., **3**, 320.	R. triple reading test.
39.	Johns, C. K., and Howson, R. K.	1940.	J. Dairy Sci., **23**, 295.	R.: M.B.: abnormal milk: inversion.
40.	Jenkins, H.	1940.	Milk Dlr., **30** (3), 58.	R. on cream.
41.	Little, L.	1940.	J. Milk Tech., **3**, 274.	R., M.B., and abnormal milk.
42.	Frayer, J. M.	1940.	Bull. Vt. Agric. Exp. Sta., No. 461.	R. and dissolved gases in milk.
43.	Schacht, F. L., and Nichols, R. E.	1940.	Rep. N.Y. St. Ass. Dairy and Milk Insp., **14**, 307.	R.: correlation with farm inspections.
44.	Thomas, S. B., and Davis, M.	1940.	Welsh J. Agric., **16**, 231.	R. and M.B.: factors affecting.
45.	Thomas, S. B., and Probert, D.	1940.	Abstr. Proc. Soc. Agric. Bact., p. 34.	Relation of leucocyte count to R. and M.B.
46.	Davis, J. G.	1941.	Dairy Industr., **6**, 238.	Mastitis index.
47.	Davis, J. G.	1941.	Food Manuf., **16**, 133.	Discussion of rejection tests.
48.	Davis, J. G.	1941.	Paper read at Proc. Soc. Agric. Bact. (Unpublished.)	Suggestions for rejection tests.
49.	Hutton, E. M., and McDonald, V. R.	1941.	J. Dep. Agric. S. Aust., **44**, 361.	R.: M.B.: staphylococci.
50.	Johns, C. K.	1941.	Rep. N.Y. St. Ass. Dairy and Milk Insp., **15**, 173.	R., M.B. and leucocytes.
51.	Schacht, F. L., and Nichols, R. E.	1941.	J. Milk Tech., **4**, 281.	R. and other rejection tests.
52.	Thomas, S. B.	1941.	Dairy Industr., **6**, 104.	Review of leucocyte and R. work.
53.	Thomas, S. B., and Probert, D.	1941.	Dairy Industr., **6**, 269.	R., M.B. and leucocytes.
54.	Thornton, H. R., McClure, F., and Sandin, R. B.	1941.	Canad. J. Res., Sect. B, **19**, 39.	R. oxidation-reduction work.
55.	Thomas, S. B.	1941.	Abstr. Proc. Soc. Agric. Bact., p. 47.	R. for churn rinses.
56.	Higginbottom, C.	1941.	Abstr. Proc. Soc. Agric. Bact., p. 32.	M.B., R. and plate count correlation.
57.	Rowlands, A., and Provan, A. L.	1941.	Abstr. Proc. Soc. Agric. Bact., p. 36.	R. and M.B. on pasteurised milk.
58.	Thomas, S. B.	1941.	Abstr. Proc. Soc. Agric. Bact., p. 34.	R. on fresh and stored udder milk.
59.	Thomas, S. B., and Probert, D.	1941.	Dairy Industr., **6**, 295.	R. and leucocytes.
60.	Johns, C. K.	1942.	Canad. J. Res., Sect. C, **20**, 336.	Criticism of No. 53.
61.	Thomas, S. B., and Thomas, B. F.	1942.	Dairy Industr., **7**, 121.	Examination of R. and rennet tablets.
62.	Little, L.	1942.	J. Milk Tech., **5**, 221.	R. and heat-resistant organisms.
63.	Davis, J. G., and Watson, D. W.	1942.	Milk Ind., **22** (8), 37.	R. at 18° C.
64.	Morgan, G. F. V.	1942.	Dairy Industr., **7**, 117.	Comparative count, etc.
65.	Baker, W., *et al.*	1942.	Biochem. J., **36**, 1/2, i.	Standards and synthesis.
66.	Thomas, S. B.	1942.	Welsh J. Agric. (In press.)	General—usful tables.
67.	Barkworth, H., *et al.*	1942.	Abstr. Proc. Soc. Agric. Bact. (In press.)	(Rapid (10 min.) R. test.
68.	Davis, J. G.	1942.	Abstr. Proc. Soc. Agric. Bact. (In press.)	Recent developments.
69.	Davis, J. G.	1942.	Milk Ind., **22** (12), 31.	Standards for milk.
70.	Davis, J. G.	1942.	Food Manuf., **17**, 308.	Recent aspects.

British Animal Husbandry

In breeding for a purpose, the breeder must be in close touch with those using his product commercially. Some instances are given here.

DESCRIBED as "in a sense a Newton Centenary Number", the fourth number of *Endeavour* has recently been published. It is a particularly interesting one, not only by virtue of the review of Newton's work on chemistry, but for other articles.

Dr. John Hammond makes a brilliant contribution to the literature of British animal husbandry. He has done much to affect the development of the breeding of animals to meet different requirements and conditions as a science in place of an art practised in the light of a shrewd though empirical judgment. In his brief historical survey he traces the first efforts to breed superior animals, which were to collect the best animals possible for the purpose in view and then to breed the best to the best. The early breeders concentrated in their herds and flocks the germ-plasm of the animals which showed the desired characteristics in the greatest degree; others came to purchase cattle from this superior stock and to establish herds of these improved animals in different parts of the country. The danger then appeared that the blood, or germ-plasm, of these superior animals would be so diluted by crossing with inferior stock in the now widely distributed herd that it would be swamped and the pioneer work in concentrating the best germ-plasm destroyed. Thus came about the first of the herd books which was instituted to concentrate the germ-plasm of the best animals.

Another method by which uniformity of purpose by breeders within the herd book was achieved was by the show-yard system, the first of which was for fat stock —that of the Smithfield Club, founded in 1798. In 1837 the Royal Agricultural Society's show was founded for breeding stock.

Production Tests

In order to ensure that the various breeds of livestock were bred to suit commercial requirements, tests of production were instituted at the shows. The Smithfield Club has kept complete records of carcass tests for meat-producing animals since 1895, the classes being judged by butchers to ensure that the improvement of the animals followed the changing tastes of the public for quality in meat. Other breed societies have run their own carcass tests for bacon and for pork.

To assist breeders to select their cows for milk production, lactation milk yields of cows were recorded by owners and breed societies, the Ayrshire and Jersey being among the first of these to operate. Later, in 1910, a universal system of milk recording throughout England and Wales was instituted by the Board of Agriculture, and registers were compiled of cows with consistent high production.

In recent years scientific workers have been trying to devise methods for measuring more accurately the various factors which go to make for quality in meat and dairy products, so as to facilitate the work of the breeder in selecting his stock.

The many breeds that exist in Great Britain are the result of interactions between two main objects that the breeders had in view—a breed for every purpose and a breed for every type of environment. Thus in cattle, for example, there are breeds for beef production, for good lowland environmental conditions, and others for cold, rough mountainous conditions; breeds for dual purposes (milk-beef), the dairy shorthorn (for good land) and the Red Poll (for poor, light, dry land); breeds for milk and breeds for cream and butter.

The same policy is noted with sheep, the breeds ranging from the Welsh and Blackfaced—improved mutton breeds suited for wet and cold mountainous districts—to the Hampshire and Suffolk improved fat lamb breeds suited to arable areas growing crops for folding purposes.

Dr. Hammond points out that in breeding for a purpose the breeder must be in close touch with those who are using his product commercially, and this has been done by the methods he outlines. With the object of reproducing the best that has gone before and, moreover, improving it, the breeder not only uses the results of the science of genetics, which enable him to eliminate unwanted characters, concentrate germ-plasm of desirable animals, and pass this to future generations with a high degree of certainty, but he also employs the results of the science of animal nutrition and animal physiology, which tell him what are the optimal conditions for the production by the animal of the qualities he desires to breed for.

Beef

As an example of the way in which these are used, for beef purposes the butcher requires an animal which will yield him a good percentage of carcass—*i.e.*, one in which the proportions of offal parts, such as head, legs, intestines, etc., is small, one which has a great thickness of muscle as compared with length of bone and one with a smooth covering of fat over the whole carcass. These things develop as the calf grows up, and the extent to which the development takes place determines the value of the animal for meat purposes. In good grassland areas or in districts where good supplementary feeds are available, it is possible to push forward the animal to full development of its meat qualities. By doing this with successive generations, and selecting and breeding from those which prove best, the proportions of the body develop not only at an earlier age but also to a further extent. Thus the adult Hereford bull of a hundred years ago is not more advanced in its body proportions than is the present-day bull of a year old.

Mutton and Lamb

Dr. Hammond calls attention to the improvement for early maturity achieved by British breeds of livestock by following the changes in proportions which occur in the growth of the wild sheep with those which occur in an improved breed like the Suffolk.

Early maturity from a butcher's point of view is not merely increase in weight for age, but consists of a speeding-up of the changes occurring in proportions of the body. From the butcher's standpoint the animal is not fit to kill until the proportion of fat and muscle to bone reaches a high level. The early maturity of improved breeds has been increased so that at about two to three months old they will yield as much edible meat as an unimproved sheep in adult life. As in the case of beef, all this has been done by rearing the animals on a high plane of nutrition and by picking out and breeding from those animals which are the most early maturing—*i.e.*, those in which the changes in body proportions occur more rapidly. The development of breeds of pigs for pork and bacon has followed much the same lines as the other animals.

Milk and Butter Fat

In connection with milk and butter fat, Dr. Hammond points out that the production should be limited by the genetics of the animal and not by limitations in food supplies. In order to obtain the highest production of milk of which the animal is genetically capable it is necessary that the food should be ample in amount and properly balanced so far as protein and mineral content are concerned. In breeding for butter production the making of butter from individual cows has played a part in increasing fat-globule size and in the better creaming of the milk. Dr. Hammond concludes by stating that the principles of modern genetics have been and are being incorporated into the administrative scheme of herd books and registers as well as in the practice of individual breeders. These principles are used to concentrate the most desirable germ-plasm and pass it on to future generations with a high degree of certainty as well as to eliminate undesirable characters. In addition, much relevant new discovery is utilised to create an environment optimal for the production of desired characters. By selecting within this optimal environment the breeder can raise the level of production and quality in his animals to higher levels than were formerly attainable.

Evolution of Chemical Laboratories

An article by J. R. Partington traces the evolution of the chemical laboratory from its nebulous beginnings connected with ancient alchemy to the laboratory accommodation and equipment of the present day. The article is beautifully illustrated by reproductions of pictures of laboratories starting from "The Alchemist," by Ostade, in the National Gallery, to a photograph of a typical modern research laboratory.

It is announced that the English edition of *Endeavour* has been so welcomed in Soviet Russia by scientific bodies in Moscow and Kuibysher that it has been decided to publish an edition in the Russian language. This will start with the current number.

T. C-W.

The Food Manufacturer's *Vade-mecum*

The technology of food is a subject in which many changes in procedure occur, due to its rapid progress. New methods replace old ones, new plant is evolved and new methods of control are worked out.

In the Preface to the twelfth edition of *Food Industries' Manual** recently published, it is stated that it is the aim of those concerned with the production of the work to follow all the important developments in the food industry and, by the yearly revision of the various sections, to record them with that accuracy and clarity which makes for rapid reference on the part of the busy food executive. The scheme of the *Manual* is well known to its users, and is a sectionalisation of the food industry into its main branches. Each section has been compiled by a well-known expert or experts in the branch it covers.

The Wheat, Milling, Flour, Baking and Food Confectionery section compiled by T. H. Fairbrother has been entirely re-written and runs to 96 pages.

The Sugar Confectionery, Chocolate, Jams and Jellies section by J. Valentine Backes has also been revised.

Considerable additions have been made to the Canning and Preserving section and the obsolete matter deleted. F. Hirst and W. B. Adam, of the Campden Research Station, have been responsible for this section.

Meat Production has been covered by T. Crosbie-Walsh, who is also the general editor of the Manual, and contains the latest developments of this subject.

J. G. Davis and S. J. Rowland brought up to date the section on the dairy industry in the last edition, and it contains a very useful sub-section written by the last-named author on the Bacteriological Control of Dairy Products.

The Boiler House, by H. C. Appleby, is a section which was introduced in the eleventh edition, and constitutes a résumé of the subject which should prove useful to engineers in the food industry.

Packing, Food Storage and Refrigeration, and The Composition of Foods are the remaining sections, and have in their turn been brought up to date in the light of current research.

Apart from the technical side of this work, the classified Index of Manufacturers and Suppliers of raw materials, products, packaging, plant and equipment should be found useful to the busy executive.

* *Food Industries' Manual.* London. Pp. 321. 15s. net.

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, November 1, page 328.

No.	*Date.* 1942.	PRICE FIXATION ORDERS
1398	July 16.	General Licence made under the bread (Control and Maximum Prices) Order, 1941. Revokes S.R. & O. 1941 No. 1543 and 1942 No. 110.
1426	,, 21.	Venison (Control and Maximum Prices) Order.
1462	,, 24.	Amending the Feeding Stuffs (Maximum Prices) Order, 1941.
1487	,, 29.	Home-Grown Wheat (Control and Prices) (Great Britain) Order. Revokes S.R. & O. 1941 Nos. 1132, 1397, 1664, 1698 and 2085; and 1942 Nos. 473, 474 (wheat only) and 789.
1488	,, 29.	Home-Grown Dredge Corn (Control and Maximum Prices) (Great Britain) Order. Further provisions contained in S.R. & O. 1942 No. 1487. Revokes S.R. & O. 1941 Nos. 1399, 1541 and 1793*, and 1942 No. 474*.
1489	,, 29.	Home-Grown Beans (Control and Maximum Prices) (Great Britain) Order. Revokes S.R. & O. 1941 Nos. 1293 and 1793*, and 1942 No. 474*.
		FISH
1784	Sept. 1.	Fish (Licensing of Dealers and Processors) Order. Revokes S.R. and O. 1940 Nos. 1024 and 1025, 1941 Nos. 417 and 1905, and 1942 No. 285.
1981	,, 17.	Fish (Port Allocation Committees) Order.
1982	,, 26.	Fish (Distribution) Order.
		FLOUR
1792	Sept. 2.	Flour (Registration) Order.
		FRUIT
1680	Aug. 22.	Canned Fruit (Prohibition of Retail Sales) Order.
		ICE-CREAM
1962	Sept. 24.	Ice-Cream (Prohibition of Manufacture and Sales) Order.
		MILK
1785	Sept. 24.	Milk (Sales to Distributors) Order.
1804	,, 4.	Milk (Control of Supplies) Order. Revokes S.R. & O. 1941 No. 2126.

* Part only revoked.

No.	*Date.* 1942.	ONIONS
1714	Aug. 27.	Home-Grown Onions (1942 Crop) (Control) Order. Revokes S.R. & O. 1941 Nos. 1120 and 1578.
		POINTS RATIONING
1587	Aug. 6.	Amending the Rationing (Personal Points) Order, 1942.
1681	,, 22.	Amending the Food (Points Rationing) (No. 2) Order, 1942.
1682	,, 22.	Amending the Rationing (Personal Points) Order, 1942.
1862	Sept. 12.	Amending the Tea (Rationing) Order, 1942.
1913	,, 18.	Amending the Food (Points Rationing) (No. 2) Order, 1942.
1914	,, 18.	Amending the Rationing (Personal Points) Order, 1942. (Confectionery.)
		RATIONING
1674	Aug. 21.	Directions under the Feeding Stuffs (Rationing) Order, 1942. (Brewers' Wet Grains.)
1696	,, 25.	Amending the Feeding Stuffs (Rationing) Order, 1942.
1756	,, 29.	Amending the Directions, May 1, 1942, given under the Feeding Stuffs (Rationing) Order, 1942, and giving further Directions thereunder.
1861	Sept. 12.	Amending the Butter, Margarine and Cooking Fats (Rationing) Order, 1942.
		TOMATOES
1674	Aug. 15.	Amending the Home-Grown Tomatoes (Distribution) (No. 2) Order, 1942.
1798	Sept. 2.	General Licence, under the Home-Grown Tomatoes (Maximum Prices) Order, 1942, the Home-Grown Tomatoes (Distribution) Order, 1942, and the Home-Grown Tomatoes (Distribution) (No. 2) Order, 1942. (Licensed pickle manufacturers.)
		TRANSPORT
1589	Aug. 6.	Directions made under the Food Transport Order, 1941. (Fresh Plums.)
1656	,, 18.	Directions. (Sector Scheme.)
1799	Sept. 3.	Directions. (Potatoes.)
1800	,, 2.	Amending the Food (Sector Scheme) Directions, August 18, 1942.
1822	,, 5.	Directions. (Condensed Milk.)
1855	,, 11.	Directions. (Onions.)
1983	,, 26.	Directions. (Fish.)

The Common Eel

Its food value and modern methods of preservation and canning

A previous article published in the May issue discussed the life history of the Common Eel. This article deals with the technical details of its preparation as food.

By ELLIOT B. DEWBERRY, M.R.I.P.H., F.R.San.I.

THE common eel is one of the most important of our fresh-water food fish.

History relates that from ancient times eels have contributed to our national diet. Large numbers of these fine plump fish are caught annually in the rivers, lakes and ponds of the British Isles. In some of the large rivers the fisheries—especially in Ireland—form quite a remunerative industry. Up to the time of the present war large quantities of live eels were imported into Great Britain from Holland and Denmark.

The eel is easily trapped, is comparatively cheap, is capable of being preserved, is nutritious and easily digested, and therefore makes a very valuable flesh food.

In the early days enormous quantities of elvers about the thickness of a straw were caught in the Severn and in Norfolk. They were prepared for food in various ways. Some were salted and pressed into cakes, sliced and cooked, others were made up into pies and sold in the famous eel-pie shops in and around London.

Previous to spawning eels reach their highest state of edible perfection. They are fat and the flesh is delicate and rich in flavour. They are eaten in a variety of forms—pickled, jellied, smoked or canned.

Food Value

The following table shows the approximate nutritive value of the eel compared with beef, mutton and pork, and other fresh-water fish :

	Protein Per Cent.	*Fat Per Cent.*	*Calories Per Pound.*
Beef (whole ox)	9·04	13·25	728·0
Mutton (whole sheep) ...	6·99	22·88	1,095·9
Pork (whole pig) ...	14·77	24·46	1,306·4
Eel	13·75	25·69	1,339·0
Salmon	17·73	20·00	1,173·0
Turbot	14·8	14·4	885·0
Herring	19·5	7·1	660·0
Mackerel	18·7	7·1	645·0
Halibut	18·6	5·2	565·0
Carp	15·79	4·77	495·0
Bream	16·19	4·09	473·0
Perch	18·45	1·40	402·0
Pike	18·45	0·66	377·0

It will be seen that the eel, in comparison with other fresh-water fish, is very rich in fat.

When unsound, eels lose their smooth and slippery feel, become dry and rough, and gases form and inflate the bellies.

The nutritive value of eels merits a far greater public demand than that which prevails. Fresh or preserved, they might easily displace equal quantities of other foodstuffs in our diet. Such a replacement would not only be beneficial but would give a much-needed fillip to the eel industry generally, which could doubtless be developed, especially in these times of national emergency.

Catching, Transport and Grading

The principal methods for catching eels in the British Isles are by using weir nets, draft nets, willow or wire basket traps and long lines, the latter being mostly used in Ireland. After being caught the eels are temporarily placed in "live boxes", which are suspended in the water. Here the slippery creatures remain until such time as they are required to be packed and dispatched to market.

The resting and fasting period in live-boxes, which is usually a week or more, allows the eels to empty, and so cleanse, themselves.

The large live-boxes vary in design. They are usually constructed of wooden planks about one-eighth of an inch apart. The small boxes have protected holes at the top, bottom and side to enable the water to pass in and out.

Eels should be handled as little as possible and must be carefully and properly packed for transit to the markets, so as to arrive alive and in prime condition. Dead eels do not travel well and should never be packed with those alive. Yellow eels should be kept separate from the *silver* ones.

Eels are graded for market—*i.e.*, extra large, large, medium and small. This enables buyers to order the particular types and sizes of fish required by the purchasers.

In packing, the eels must not be crowded together or they will die during the journey. A single layer of eels should be placed in each box or tray.

The size of the most suitable packing-box, or case, is 2½ feet long by 2 feet wide and 3 inches deep. A transverse partition is fixed in the centre to prevent the fish from sliding to one end. Such a box holds about 21 to 25 lbs. of eels. Large cases fitted with four trays are also used. In warm weather a special top tray is filled with pieces of ice. The water from the melting ice trickles down on to the fish below, keeping them moist and cool.

PRESERVATION AND CANNING OF EELS

Smoked Eels

The eels are rubbed with a small quantity of fine salt to remove the slime. The fish is slitted from head to tail, the viscera and the large veins along the back-

bones removed, and the eels immersed in strong brine (20 lbs. of salt to 100 lbs. of fish) from 1½ to 7 hours. The salting period varies according to the size and thickness of the fish, strength of brine and desired flavour. The fish is removed from the brine and well washed with water, using a soft brush to get rid of blood and surplus salt, etc. Some curers place the fish in a tub of water and beat them with a net for several minutes.

The cleansed eels, which are strung on half-inch diameter iron or steel rods passing through the throat cartilage and out of the mouth of each fish, are placed in the open air for a few hours to dry before being hung up in the smoke-house.

Smoking

The period of smoking depends upon the type of smoke-house available. Where small brick ovens are used, mild smoking is carried out from 4 to 6 hours or until the eels have acquired the desired colour. The fires are then increased and the fish hot-smoked or cooked from 30 to 40 minutes.

In the larger types of smoke-houses the eels are subjected to mild smoking at an even temperature for a period of 6 to 8 hours. Mahogany or cedar wood sawdust is used for making the smoke and white oak wood or white hickory for cooking. When the eels are sufficiently cooked the skin can be easily separated from the flesh.

In Washington, U.S.A., the eels are suspended in "hogshead" smoke-houses over a fire made of oak and hickory wood and dried for 20 minutes. The hogshead is then covered with sacking and the fish are hot-smoked for 3 or 4 hours, the fires being sprinkled with water from time to time to produce a hot vapour.

Smoking must be carefully regulated. If the heat is too great the eels will curl up and lose their shape. One hundred lbs. of eels yield 65 to 75 lbs. of smoked fish.

"Skinned" eels require less salting and smoking. It is difficult, however, to prevent them from curling and falling off the hooks.

Smoked eels keep less time than almost any other smoked fish. Pickled from 6 to 8 hours, they usually keep in good condition from 10 to 12 days, but if pickled for only 2 hours they become mouldy in 5 to 6 days.

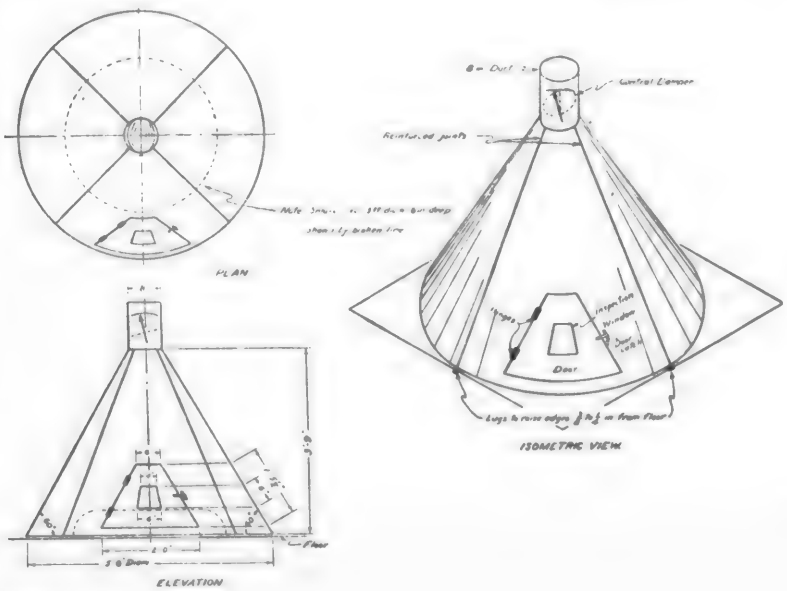
A Mechanical Smoke Producer

The smoke producer ("A" type) which has been described by D. le B. Cooper of the Fisheries Experimental Station, Halifax, N.S., was the result of experimentation over a period of six years. This apparatus is designed to produce a suitable smoke, using the old-fashioned wood fire. Used in connection with the shorter type of smoke-house, without loss of capacity and without burning the fish, the smoke is cooled before it enters the smoke-house and the temperature and humidity are controlled.

The smoke producer takes the form of a conical hood with a space round the bottom to admit air. Very slight suction is applied to the top by a fan which—like the natural draught of a fire—draws the smoke from the fire into the smoke-house. A damper is fixed near the top of the cone to control the admission of air, and a door, having an inspection window which can be tightly closed, is inserted near the base of the hood to allow the fire to be laid and tended. Well-fitted lugs are necessary to support the hood so that the bottom is about ¼ inch above the floor. This space must be raked out every time the smoke producer is used, in order to allow the free entrance of air.

Working Method

A 2-inch layer of dry shavings, well packed down, is placed on the floor of the smoke producer, the edge of the shavings about 1 foot away from the air vent. On



Details and Isometric View of Smoke Producer (Type A).

the shavings is placed a 3-inch layer of dry hardwood sawdust, also well pressed down. The damper near the top of the cone is left wide open and the fire then lighted all round. The damper, being open, allows a good draught and plenty of air, thus the fire is given a good start. After a few minutes the damper is closed and the fire damped down with a few handfuls of sawdust on the parts that have burst into flame, and the door at the base partially closed.

Smoke will now issue from the bottom of the cone and around the door. The damper is opened slightly to stop this and the door closed tightly. The damper being correctly set, no further attention will be necessary for some hours except an occasional peep through the inspection window. If the smouldering fire should burst into flame, the door should be opened and a small quantity of sawdust thrown on the blazing parts; the door is then closed and the damper readjusted.

The admission of too much air causes the fire to become too hot. If too little air is admitted the fire will not burn evenly and the volume of smoke will be small.

The charge of fuel should last 3 or 4 hours, after which the ashes should be raked out and new material laid for a new fire.

Dry hardwood sawdust is the best. It contains very little resin (turpentine), is heavier than softwood sawdust and can be lightly packed.

Oak or birch are the most popular woods used, but ash, elm, poplar or maple will serve the purpose.

Softwood sawdust (except pine wood) or a mixture of soft and hard woods, may be used if sufficient hard woods are not available. Hard and soft woods should be carefully dried before use.

SMOKE HOUSE

The mechanical smoke producer (" A " type) may be used in conjunction with smoke house (type " B "), which also has been described by D. le B. Cooper. The efficacy of the smoke house, type " B ", is the result of several years' investigation of methods for smoking and pre-drying fish. This investigation showed that, in the smoking of white fish, the temperature of the house should be between 67° and 73° F., and the relative humidity controlled, in order to obtain fish of suitable dryness. The smoke should move quickly and be evenly distributed so that the fish are rapidly and sufficiently cured. The house should be able to be used for drying-off the fish prior to smoking. Initial cost and running expenses must be low.

Constructional Details

The house is an $8' \times 8' \times 6'$ insulated wooden box, and is intended for installation inside a building or under a covered shed. A number of pipes connected to the box and to a fan permit smoke to be blown in from smoke producer " A ". Provision is made for warming the smoke in cold, or cooling it in warm, weather. Cooling is done by carrying air through ice and then blowing it with the hot smoke into the house. Alternately the fan and duct system is used to supply warm dry air for the preliminary drying before smoking. When conditions are suitable, the arrangement of the ducts provides for partial re-circulation of the smoke or air.

The importance of making the house tight cannot be over-estimated, especially if it is to be installed near other equipment, or in a position in which a leak of smoke would be a nuisance.

Sizes of timber and details can be changed to suit local requirements.

A floor is laid on beams $2'' \times 4''$. The floor should be of 3-inch dried spruce or other suitable wood, blind and face nailed, with the tongue laid in paint. A good-quality building paper is tacked on this sub-floor and a second set of $2'' \times 3''$ beams laid on this by the usual method. The spaces between the beams are filled with dry shavings or sawdust, with which has been mixed 1 lb. of lime for each bag of filler. The beams are then covered with tarred building paper of good quality. The laps in the paper (each of which should be over a beam) are then tarred. Sufficient paper should be left at the sides and ends to fold up to meet the wall-paper and the joint tarred. The main floor is then laid on in the same way as described for the sub-floor.

The walls and roof are framed in with $2'' \times 3''$ beams and rafters and the inside walls and ceiling nailed on. These may be either of flooring or a good quality surfaced wall-board. In districts where dried lumber is difficult to obtain or too expensive to buy, wall-board is suitable for inside use. The studs are covered with paper laid parallel to the rafters, the laps sealed in tar, as described for the floor, and the wall-board laid on top. The paper must be long enough to fold around each corner and tarred. The joints of the wall-board should come over the beams or rafters and be laid in putty or soft roofing cement. A finishing strip is then laid in paint over the joints. The corners should be filled and finished with " quarter-round ", also laid in paint.

The outer walls are then commenced. A strip of paper is nailed at right angles to the studs and the wall boarded in to within about 6 inches of the top of the paper. The section is then filled with dry shavings and lime well pressed down. Another strip of paper is added and covered; this is continued until the wall is complete. The roof is nailed on over the paper, the spaces having been filled with shavings as for the floor.

Care should be taken to frame in the two wall outlets—for the inlet and outlet trunkway.

This is framed with $2'' \times 3''$ and the inner boarding nailed on. The space between the frame is filled with insulation and the outer boarding nailed in place. The frame should be papered outside and inside. The outer boarding is allowed to extend all round the door to form a lip (gasketed with hollow rubber strip) of a size to take up on the outside wall of the smoke house —*i.e.*, the door should not set in flush.

One side of the door is hinged to the outer wall, as follows: The pins, of two pin-plate hinges, are screwed directly to the wall—*i.e.*, the door is not framed on the hinge side. The plates are then slightly sprung, turned upside down and screwed to the door. This means that the pin-plate hinges will act as an offset hinge. The bend in the plate causes the lip and its weather strip to bind firmly against the wall. The door is framed on the other side with finished 1- inch stock. Two buttons, bolted through the frame, take up on two wedges on the door, and thus the door, which should have a small window, can be jammed tight.

Electric light and a thermometer fixed near window should be provided in the smoke house.

Trunkways, Fans and Ducts

The evenness of the smoking depends on the care in the construction and placing of these trunkways. The outlet trunkway is made reversed—*i.e.*, the largest part is put at the opposite end, each one sized, as shown, with the smallest at the end nearest the outlet, as in the isometric sketch of the house.

The most suitable fan is the straight blade cast-iron blower with about a 13-inch wheel operated at a speed of 1,700 revolutions per minute. This will require a ½-h.p. motor. The outlet end of the fan is connected directly to the inlet trunkway, the inlet end to a duct, which includes a connection to the smoke producer, a connection to an air cooler (ice-box) and one to a re-circulation duct.

These are of standard 8-inch galvanised iron pipe with three-piece elbows.

Air Cooler

During hot weather provision must be made for cooling the smoke or drying the air, so that the temperature in the house will not go above 73° F. Smoke is spoiled by passing it through cold pipes or over cold surfaces, so the method used is to blow cold air in along with the smoke. During cold weather the air is taken in from outside, but during warm weather the air must be cooled by passing it through a cooler—an ice-box, as shown in sketch.

The cooler should be lined with galvanised iron or zinc. The weather strip on the cover must take up around the box and also along the centre partition. The partition causes the air to go down through the ice and up through on the outlet. The cover is hinged with pin-plate hinges, the plate being reversed so as to make the hinge act as an offset.

Heating the Air for Drying

There are two methods: (1) A small clear wood fire may be lit in the smoke producer and the warm air drawn into the house, or (2) an additional steam heater may be installed and the air heated by steam from a boiler. The heater is a 12″ × 12″ multivane heater operated at 5 to 10 lbs. steam pressure and controlled by an automatic valve. The type of control will depend on the arrangement of the plant.

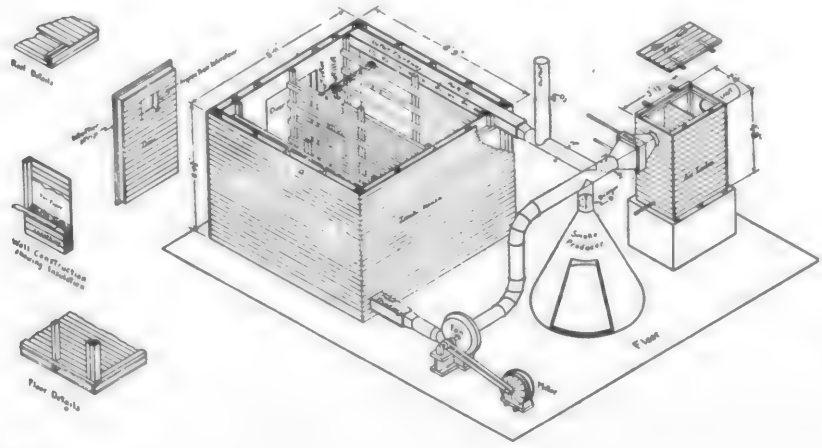
The duct is fitted with three dampers—A, B and C. A prevents snow and rain from entering the house when it is not in use; ordinarily this damper is left open. B controls the amount of re-circulation of the smoke or air through the fan and, to a certain extent, the draught through the smoker and the air through the cooler. It is usually open so as to obtain all the re-circulation possible. The fan, however, is adjusted so that when the damper is open more air will be re-circulated than will be drawn in through the cooler. On exceptionally warm days it may be necessary to close, or partially close, B so that more cold air can be drawn in with the smoke to cool the house. During drying-off, if no steam heater is used, it is preferable to keep B closed and A wide open. In this way the house is getting a continuous supply of fresh dry air. While smoking it is preferable to keep B wide open; thus smoke is economised and the fish will be cured more quickly. C controls the amount of cold air mixing with the smoke and the temperature of the house. This is the most important damper.

The racks are of 2″ × 3″ dressed spruce or other suitable wood. The end of the racks start 1 foot from each side wall. This places them well clear of the trunkways. The cross-bars should be spaced about 9 inches, centres starting about 14 inches from the floor and ending about 12 inches from the ceiling.

The tenters are made of curved forms, as shown. The ends are of 1-inch dressed birch, the rods of ½-inch hardwood. The whole length of the tenter is 36 inches to fit between the rocks.

General Control

After drying-off, it takes about ten minutes to lay the smoke fire and to get it working properly and another five to adjust the controls and dampers. Once this is done the house will run with little attention for some time. All that is required is to peep through the view door in the smoke producer from time to time to see that the fire has not broken into flame, and to look at the thermometer in the house to see that the temperature is remaining at 73° F.



Isometric Assembly Smoke House (Type B).

OTHER METHODS OF PREPARATION

Canned Eels

Eels which have been mildly smoked are cut into pieces of suitable length, packed into the cans and exhausted for 10 minutes at 212° F.

The spaces between the pieces of fish are then filled with hot olive or good cottonseed oil. The cans are immediately sealed and processed for 70 to 90 minutes, according to the size of the cans, at 10 lbs. pressure (240° F.).

Eels à la Galantine

The eels are skinned, eviscerated and thoroughly cleansed in cold water. To 100 lbs. of fish is added 10 lbs. of fine salt and 15 gallons of water, and the fish boiled for one hour. The flesh is carefully removed from the backbone in moderately large pieces, using a paring knife for the purpose.

To 100 lbs. of eel flesh is added ½ lb. of powdered black pepper, 6 lbs. of chopped onions and 5 gallons of hot jelly, which is prepared as follows: 1¾ lbs. of gelatine and 1½ lbs. of agar is dissolved in 5 gallons of water on a hot water-bath.

The ingredients are thoroughly mixed, care being taken to retain the pieces of eel flesh as large as possible. The hot mixture is then poured into cans of suitable size, which are immediately sealed and then processed for 1 hour at 15 lbs. pressure. The cans are removed and cooled as quickly as possible.

Spiced Eels in Cans or Jars

The fish is skinned, slit open, and the viscera and large veins along the backbone removed, after which it is thoroughly cleansed in cold water. It is then cut into suitable lengths for canning, and soaked in brine for 1 hour (1 lb. of salt dissolved in 2 gallons of water). After removal from the brine it is packed loosely into containers to a weight averaging 20 ounces, and filled with spiced vinegar sauce (diluted one-half with water), which is prepared as follows:

Vinegar	4 pints	Cardamon seeds (cracked) ...	⅛ oz.
Water	2 ,,	Whole ginger (cracked) ...	⅛ ,,
Sugar	2 ozs.	Bay leaves ...	⅛ ,,
Cloves	¼ oz.		
Mustard seed ...	¼ ,,		
Whole white pepper ...	¼ ,,		

The sugar and water are added to the vinegar and then spices (tied in a muslin bag), and the whole allowed to simmer for 1 hour. After straining the liquid is ready for use.

(*a*) The containers are placed in boiling water at a level of about 2 inches below the rims and allowed to boil for 20 minutes.

(*b*) If pint jars are used, they are placed in cold water at the same level. The water is brought to the boil and cooked for 20 minutes.

The containers are inverted over a wire screen to drain for a few minutes. To each can or jar is added several slices of raw onion, a bay leaf, a few mixed spices, ¼ teaspoonful of salt, a teaspoonful of olive oil and enough spiced vinegar to cover the fish.

(*a*) The lids of cans are clinched loosely and the cans steamed for 10 minutes at 212° F. The cans are then sealed and processed for 80 minutes at 10 lbs. pressure (240° F.) and cooled in the usual way.

(*b*) The pint jars are sealed loosely and processed for 90 minutes at 10 lbs. pressure (240° F.). The pressure is released gradually after sterilisation. Seals of jars are tightened up and cooled off in air.

Jellied Eels

Medium and small eels are selected for the purpose. The heads, skins, viscera and large veins along the backbones are removed and the fish well washed in cold salt water. Cut into suitable lengths for the cans, the fish is placed on wire trays and cooked in a steamer for 20 to 30 minutes. The cans are then loosely filled with the pieces of fish and enough jelly is poured in to hold them well together. The cans are partially sealed and exhausted for about 10 minutes at 212° F., after which they are sealed and processed for 90 minutes at 240° F.

The jelly is made from the following materials: Bones, fins and heads of any white fish, a small quantity of salt, mace and pepper, 10 per cent. agar, bouquet garnet.

The bones, fins and heads are covered with water, seasoning added and the whole allowed to simmer until all the goodness is extracted. The liquor is skimmed and strained through muslin. No exhausting is necessary if packed when hot.

Correspondence

"Tinned" or "Canned"?

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—May I chide you gently on the quotation of Robert Lynd, in *Obiter Dicta*, p. 237, of your August issue—"Canned is good American, but tinned is better English."

Apparently the early New England term was tin case or tin canister, soon abbreviated to tin can or can. Inasmuch as many metal containers no longer contain tin, I think that the emphasis is better placed on the can as a receptacle. I shudder to think of Mr. Lynd's food being tinned in any literal sense, just as I have difficulty in visualising his clothes being coppered. Yet copper can mean a metal, and, by extension, a receptacle, and, of course, even a "Peeler". Fortunately nobody in England will confuse the last mentioned with one who engages in ecdysis (see H. L. Mencken—ecdysiast). Unfortunately, they will look askance at the man who is a chemist, but not a pharmacist.

Opinion may be divided on Mr. Mencken's use of ecdysiast. Suggesting a stripping off, it contains no hint of tease. Possibly this is as it should be.

Can we not, rather, concede happily that normal English is indeed both good American and good English, and where, then, can better English be found?

Yours sincerely,
G. MACKINNEY.

AGRICULTURAL EXPERIMENT STATION,
UNIVERSITY OF CALIFORNIA.

"Britain Can Feed Herself"

THE argument of this book* is the least of its merits. The major part of its case is that there is no *agricultural* reason why Britain should not be able in five or six years to produce from her own soil the whole of the essential foodstuffs her population needs.

If the author's large assumptions are granted, this part of his case may probably be conceded. But it would be equally possible to prove that there is no *horticultural* reason why Britain should not be self-sufficient in bananas.

Cost of Home-Produced Food

The second part of his case is that home-produced food would be cheaper than our food in pre-war, even though two-thirds of it was then imported. This part of his argument is less convincing. In the first place, his arithmetic is valid only on the assumption that there is no waste—that every scrap of food grown on British farms actually reaches the consumer's table. Secondly, he presupposes that nearly a million additional workers can be persuaded to enter agriculture for a wage of £3; nothing less probable can be imagined. Thirdly, his proposals would involve a considerable increase in average yields and radical changes in farming technique without any amalgamation of holdings or interference with farmers others than control "on broad lines" of the cropping programme. Finally, he appears to believe that we can deprive overseas food-producers of more than £400,000,000 of trade without repercussions on our own export trade which would threaten the financial basis of our own policy of food self-sufficiency. A minor illustration of these repercussions relates to fertiliser supply, and since Colonel Pollitt is a director of Imperial Chemical Industries one may assume he will be ready to meet the objection. But how, it may be asked, can we expect to secure the 1,300,000 tons of basic slag his plan calls for unless the steel industry is booming? It might be contended, of course, that the self-sufficiency policy would merely divert purchasing power from the overseas to the home farmer and that the result would be an equivalent demand for British steel. This is fallacious, partly because the effect of the diversion would be a change in the character of the demand, and chiefly because if we discontinued our foreign purchases of food the result would be disruption of the whole economies and finances of primary producing countries; the effect on our own export trade could not fail to be disastrous.

It would be easy to make a score of similar points against the argument of this book, but by doing so one would miss its real significance and value. The argument may be rejected completely and yet the book recognised as the most important contribution to nutritional and agricultural reasoning since Orr's *Food, Health and Income*. Indeed, he carries Orr's work to the next logical stage.

It is the method of approach to the problem which is chiefly to be commended. When a politician produces a policy for agriculture he tends to think in terms of organisation and not of products. He produces proposals for the reform of land taxation, ownership, tithe; he sets up committees, boards, commissions, councils, corporations, and carefully circumscribes and defines the powers of each; to get his policy accepted he does not forget the appeal to emotion, calling for sympathy for the sturdy yeoman or the thrifty peasant or the benevolent landowner aristocrat.

Colonel Pollitt's approach is vastly more practical. He is concerned with things, quantities and methods. He takes as his starting point the average pre-war daily diet, modifies it slightly by excluding products which cannot be produced in this country, and then calculates the total requirements of each foodstuff per year for a population of 47,700,000. Having taken into account the industrial and agricultural by-products and waste products which will be available as stock-food, he then estimates the tonnage of feedingstuffs which will be needed for livestock, and calculates also the acreage needed for each crop both for human and animal consumption. A table showing production per animal and per acre states the assumptions on which the author bases his calculations.

Mineral Requirements

To arrive at annual mineral requirements, the quantities of nitrogen, phosphoric acid, potash and lime sold off the farms in the form of food for human use are calculated for each crop, as well as the loss of lime through leaching, and these totals are offset by the plant-foods replaced in the soil by industrial by-products used as stock food, by clover crops (in the case of nitrogen) and by rain, snow and dew. From the fertility balance sheet thus constructed the author arrives at the quantities of fertilisers required for the execution of his plan. These quantities are formidable. Separate calculations are made for the labour and fixed capital and working capital needed, leading to a statement of costs and production, from which it is concluded that these costs are a few million pounds lower than the £658,000,000 which Britain paid for home-produced plus imported food in 1938.

Appendixes go into much greater detail about the production of animal feeding-stuffs and crops, and the new equipment and stock on which the fixed and working capital is spent.

Revolutionary Farming Technique

The remaining chapters are an admirable summary of modern methods of farm management and technique recommended by the author as a means to the grand aim. For the most part these proposals are admittedly no more than sound practices which have won acceptance through the advocacy of such men as Sir George Stapledon; but in some directions Colonel Pollitt's proposals call for changes in farming technique which would be wholly revolutionary. For example, he argues that hay is a wasteful method of preserving grass, and would make grass-drying (not silage) the basis of herbage preservation throughout the country. Again, he provides in his plan for no fewer than 347,000 tractors,

(*Continued on page* 360)

* *Britain Can Feed Herself.* By George P. Pollitt, D.S.O., M.Sc., Ph.D. Pp. 52. 1942. 3s. 6d.

The Storage of Potatoes

In the May issue of FOOD MANUFACTURE was discussed the storage of potatoes for chip making, with special reference to the effect of temperature of storage on the reducing sugar content, which, in turn, governs the colour of the resultant chips made when the potatoes are fried. This article deals with some further work which has been reported recently.

SPECIALLY CONTRIBUTED.

IT HAS been found that the amount of reducing sugar formed when the potatoes are stored at 7° C. is only 35 per cent. of that formed when the storage temperature is 5° C. If the temperature of storage is kept at 8·2° C. the amount of reducing sugar formed is only 66 per cent. of the amount formed at 5° C., but advantage cannot be taken of this as, unfortunately, the amount of sprouting at the higher temperature is much more extensive than at lower storage temperatures. It is interesting to note, therefore, that recent work has been directed towards the prevention of sprouting of the tubers in storage, and such work has direct value to all those who have to store potatoes for any purpose. The daily Press has recently made an outcry about the alleged spoiling of some 20,000 tons of potatoes, and any work which has a bearing on the prevention of a recurrence of such a wastage is of national interest.

Methyl Ester of Naphthalene-Acetic Acid

The set of workers who carried out the investigations outlined above contribute to the recent work, and their original paper is well worth close study and following up (F. E. Denny, J. D. Guthrie and N. C. Thornton, *Contributions Boyce-Thompson Inst.*, 1942, **12**, 253). They find that the vapour of the methyl ester of naphthalene-acetic acid has a powerful retarding effect on the sprouting of tubers. Unfortunately, at the present time there is a lack of information as to the toxicity of this compound, so that, until it has been established that it is innocuous when ingested by human beings, the use of this material in the food industry is inadvisable.

The method of applying the ester is interesting in that it suggests that, should the material be given a "clean bill of health" after further work, it should present no difficulties in application on a commercial scale. Denny *et al.* impregnate filter paper with the methyl ester and put it in a jar containing 1 to 1·3 kg. of potatoes, after which the jar is covered with a perforated paper lid. The methyl ester volatilises or vapourises slowly and continuously, giving an atmosphere around the potatoes charged with the ester which retards the sprouting. Normally, at the temperature of 10° C., sprouting occurs freely during storage, but in the presence of the methyl ester no sprouting occurred up to one year. When the storage temperature was maintained at 15° C. in the presence of the ester the sprouting was inhibited for some six to eight months, but some shrinkage was observed. Inhibition periods of three to six months were observed with other samples stored at a temperature of 20° to 25° C. This temperature range was, however, unfavourable inasmuch as some shrivelling was encountered, due to loss of moisture by the tubers.

Limits to Inhibiting Effects

The inhibiting effect can be exerted by quite small amounts of the ester. For example, when 400 mg. of the ester was used to impregnate filter paper put in with 1 kg. of tubers no sprouting was observed for many months. One hundred mg. retarded the sprouting for some time, but tiny sprouts had appeared at the end of a few months. Even with as little as 10 mg. present an observable effect in retarding sprouting was obtained. After one test had been completed the same paper was used for a fresh batch of tubers, and was successful in producing a similar inhibiting effect.

The treatment has little effect on the sugar content of the juice of the tubers, and in most tests there was no difference between the treated tubers and those used for control in this respect. The changes that were noted in the reducing sugars and the sucrose content were usually below 1 mg. per c.c. of juice. In some tests there appeared to be significant differences in the sugar content between the treated and the control tubers, but there could be found no agreement among such tests as to the direction of the change. In any case, as just mentioned, the effect was small, and the results indicate that potato tubers can be stored under temperature conditions favourable for the maintenance of a low sugar content in the tuber and that sprouting can be inhibited under these same conditions.

Effect on Root Growth

The use of compounds of the above class for preventing the scission of apples has already been discussed several times in these pages, and their use in accelerating root formation is well known. The addition of these "growth hormones" to various plant materials results in marked responses over appropriate concentration ranges. The behaviour varies with the particular compound used, the method of application and the development stage of the plant. It has been found that the hormones can be incorporated into a suitable diluent carrier, and when dusted on the seeds cause a substantial increase in both root and top development. In some cases it has been noted that a long exposure to weak solutions of this type of substance produced a toxic or inhibitory effect upon root growth, whereas a short exposure stimulated it. The retarding effect of the methyl ester of naphthalene-acetic acid may well, therefore, be due to some toxic action on the tubers. Whether, in inhibiting the sprouting, it is actually absorbed by the tuber has not been established, but it

may well be that this does take place. It has been noted with cuttings of some deciduous plants that immersion in a weak solution of root-growth-promoting substance appears to be without effect, but, if applied under vacuum, on breaking the vacuum the solution is driven up the stems and root growth follows. This shows that in these cases, at least, absorption of the compound is necessary to produce the desired effect.

Potential Importance of Plant Hormones

The whole field of plant hormones is of intense interest and of great potential importance to the food industry, and it would appear that so far the scientist has but penetrated the fringe of the possibilities. These substances can now be applied as vapour, liquid, salves —*i.e.*, dissolved or dispersed in mucilaginous or greasy substances—and dusts to give a variety of effects which are controlled by many factors.

In addition to their use in preventing scission of fruit or sprouting of tubers in promoting root and top growth, they have also been employed to nullify or minimise the damage to cereals by the formaldehyde used for disinfection purposes. Damage by copper sulphate or mercuric chloride solutions is also lessened when 0·01 to 10 parts per million of β-indolylacetic acid or naphthalene-acetic acid are added to the solutions. Normally, when the cereals are treated with these materials to kill smuts the germination is often reduced and the growth retarded, but this effect is minimised by the above additions.

Even when the plant material is dead, as is the case with cotton thread and hemp cord, plant hormones will not allow it to rest in peace, for, according to H. Nicol (*Manuf. Chem.*, 1937, **8**, 175), these materials stretch more when treated with lanoline containing 0·2 per cent. indolylacetic acid than when treated with lanoline alone.

Beef Blood Plasma for Transfusion

"IMPORTANT progress is being made on methods of utilising beef blood for transfusion purposes.

Wholesale testing of the new beef blood plasma on 2,714 inmates of Massachusetts penal institutions is reported. The tests were administered by members of the Harvard medical school, who have been working with the packing-house product the last eighteen months to determine its possibility in replacing human blood in wartime transfusions. Experimental results so far have been very favourable. Of the more than 2,700 men given the beef blood plasma, only seven showed an unfavourable reaction.

Submission to the test was entirely voluntary on the part of the prisoners. The tests consisted of injections of human blood and of the beef plasma into the forearm a few inches apart. Flecks of dried human plasma were placed in one eye, dried beef plasma in the other. Subjects were then watched closely for 45 minutes to observe any reactions from the treatments. Previously, similar tests were made among interested research workers.

Use of beef blood would have several advantages over the use of human blood, research workers point out. It is not necessary to type the beef blood as is the case with the human product. Human plasma in blood banks must be kept at lower temperatures than is necessary with the packing-house product—a disadvantage under field conditions. Supply of beef plasma is practically unlimited, several million gallons being produced annually by packers.

Research workers have been concerned with the problem of preparing beef albumen in such a form that it would be harmless when injected into man. Albumen is used to fight shock because it has the property of holding the liquid in which it is dissolved in the blood stream. Under conditions of shock the blood vessels lose their ability to keep blood and other fluids within their walls."—*The National Provisioner.*

Britain Can Feed Herself

(*Continued from page 358*)

and would have us use straw pulp and chaff treated with caustic soda, as well as potato haulm as standard feeding-stuffs, though the quantities available are not taken into account in his calculations.

In summarising the method of the book, few figures have been quoted because it would not be fair to the author to quote them except in the context of his own carefully thought-out reasoning. It may, however, serve to summarise his argument if some of the aggregate figures of cost and production are quoted. Over the whole country, at 1938 prices and values, Colonel Pollitt's plan would call for an expenditure of £99,000,000 on fertilisers and lime (at 47s. per acre), £15,000,000 for coke for drying plants, £9,000,000 for caustic soda, £26,000,000 for liquid fuel and lubricating oil for tractors, £19,000,000 for electricity and £50,000,000 for maintenance and depreciation of plant and implements (including drying plants). The new fixed capital required would amount to £707,000,000, bringing the total fixed capital per acre to £45 7s., compared with £20 7s. in 1938.

No part of the book reveals so well the weakness of its argument as the chapter in which Colonel Pollitt, as a concession to imperial sentiment, discusses what is to be done with the agricultural produce of British overseas countries. Whether we (and our cattle) eat this embarrassing stuff as an "extra", or merely continue to import it and reduce the standard of high farming the author advocates, he leaves an open question. But he has calculated what we should have to consume if we imported the Empire's foodstuffs in addition to our own produce under the Pollitt plan. The additional tax on our digestive systems would seem to be less than one might have expected, except that we should have to eat 14·272 ozs. of cereals daily. The only dietetic comfort Colonel Pollitt offers is that "if these were consumed not only as bread, but as prepared breakfast foods eaten with separated milk and sugar, they could probably be usefully employed". This is a policy not of self-sufficiency but of national repletion.

The book might be said to advocate an agricultural Maginot Line for Britain. It is not a hopeful or feasible policy. But the author's technique might easily be employed to work out an alternative policy which would enable agriculture to serve the nation in both peace and war.

News from the Industry

Milk for Catering Establishments

The Ministry of Food announces that, owing to the reduced supplies of liquid milk available, it has become necessary to restrict the allowance of non-priority catering establishments to one-third of the amounts which they are at present entitled to obtain.

The balance of their requirements will continue to be met as hitherto from the supplies of processed milk which the Ministry has made available for the purpose.

* * *

Dr. W. McCullum Clyde

The Secretary of State for the Colonies has, with the concurrence of the Minister of Food, appointed Dr. W. McCullum Clyde, Deputy Divisional Food Officer, Eastern (Dundee) Division, to be adviser on wartime food supply for the Colonies.

The St. Andrews University Court and the University Council, Dundee, have agreed to release Dr. Clyde from his duties.

* * *

Saccharin

Mr. W. J. Thorne asked the Parliamentary Secretary to the Ministry of Food in the House of Commons recently if he was aware of a shortage of saccharin tablets, which were so valuable to thousands of householders, and if he intended taking any action in the matter. Mr. Mabane replied: "I am aware that there is an unsatisfied demand for saccharin tablets, but as the raw materials are required for more essential purposes I can see no prospect in existing circumstances of increasing the present production, which is about 25 times pre-war output."

* * *

Record Tea Crop

Tanganyika's tea crop for 1942 is expected to yield 1,500,000 lbs. avoirdupois. This will be 500,000 lbs. more than the record total of last year.

Production is expected to reach 1,750,000 lbs. in 1943 and 2,000,000 lbs. in 1944.

Fish Distribution

The annual report of the Fish Industry Joint Council says that a complete breakdown in fish distribution is likely to result from the Ministry of Food zoning scheme. The report disclaims responsibility for the scheme and says that the Council's opinion, expressed to the Ministry in "no uncertain terms", is that unless greater flexibility in disposal of supplies is introduced, serious waste must result. Nevertheless, the Council will do everything in its power to make the scheme a success.

* * *

Reconstituted Dried Egg

The Ministry of Food advises flour confectioners that in making cakes and biscuits it is often found best to let the eggs stand for some hours after mixing and before using. The mixture may be kept in a refrigerator for a maximum time of six hours, or covered in a cool room for a maximum period of three hours.

If these times are exceeded, deterioration of the mixture by too long standing may take place, and also contamination if it is exposed in an unsuitable atmosphere.

* * *

Condensed Milk Pool

Condensed Milk Pool is the name of a private company which has been formed with a capital of £12,500 in 1s. shares to act for the Minister of Food in connection with the distribution of condensed milk and other prescribed commodities. The term "condensed milk" does not include dried milk or milk powder.

The first members of the management committee are: Messrs. Leonard Maggs (Wilts United Dairies), John W. Gwynn (Nestlé's Milk Products), Chas. T. Lehmann (R. Lehmann and Co.), Joseph McMullen (Cow and Gate, Ltd.), Geo. E. Wilford (Libby, McNeill and Libby), Wm. Bird (Co-operative Wholesale Society), Thos. Macpherson (Macpherson Train and Co.) and Arthur L. Finch.

Zoning or Concentration?

The indefinite postponement of the zoning scheme for confectionery manufacturers has been followed by the announcement (in a London evening paper) of an alternative scheme for the concentration of certain food industries in selected areas of the country, which, of course, would entail the abandonment of the zoning plan, under which manufacturers would have a limited distribution of their products in agreed areas.

Whether confectionery is likely to be one of the industries affected is not clear, but it would seem that any concentration of food manufacture in one particular area might be a highly dangerous expedient in the event of invasion or concentrated air attack, to say nothing of the question of transport, economy in which was one of the main arguments for zoning, states *Confectionery News*.

* * *

British Standards Institution

At the annual general meeting of the British Standards Institution Sir Percy Ashley, K.B.E., C.B., accepted the invitation to remain as chairman of the General Council.

Dr. E. F. Armstrong, F.R.S., formerly chairman of the Clerical Divisional Council, was co-opted as a permanent member of the General Council.

The chairman reported the recognition of H.M. Government of the Institution as the body for the issue of national standards with the exception of those issued by the Medical Research Council in the British Pharmacopœia and Codex.

Since the last meeting the Institution has published 160 new and revised standards, bringing the total issued to 1,300. These include war emergency specifications prepared at the request of the Ministry of Aircraft Production, Board of Trade, Ministry of Home Security and Ministry of Supply.

British Standard Specifications are the result of the work of some 8,000 representatives of most of the industrial and trade organisations in the country.

Post-War Reconstruction

There will be a great need to modernise plant after the war. Air Ducts, Ltd., advise that they are equipped with every modern engineering machine and device to design and produce anything in metal, such as bins, mixers, shoots, metal tables, drainers with sinks, etc. The manipulation of stainless metals is a specialist's job and calls for the greatest skill in bending, cutting and welding. Electric arc and butt welding, as well as oxy-acetylene and sif-bronze welding, power pressing, section bending, folding and stamping, are some of the processes which are carried out by the firm. Finishing processes of degreasing, spraying, dipping, air drying and stoving are also carried out, and all products are subject to A.I.D. standard inspection.

A technical staff always ready to give advice or prepare designs and working drawings are at disposal.

* * *

Automatic Electrical Control

The main difficulty arising out of the design of a simple and reliable electric relay system is arcing at contacts, both in the primary circuit, which is opened or closed by the critical event which it is desired should control the system, and in the heavier secondary circuit which has to do the work incidental to control. This arcing results in corrosion or burning of the contacts and quickly makes the apparatus unreliable. The removal of the difficulty depends on (*a*) making the operating current as small as possible and as nearly as may be non-inducive; (*b*) providing positive prevention of sparking at the contacts of the heavier circuit that operates the actual control.

The embodiment of these requirements in a simple, adaptable and relatively cheap unit would at once make possible an enormous widening in the scope and application of automatic electrical control throughout industry.

It was with these considerations, say Sunvic Controls, Ltd., in the latest of their booklets, that they developed their Hotwire Vacuum Switch. Details of its advantages are contained in the booklet.

Cooking in the Dark

Cooking vegetables in darkness, under covered roasters or in ovens, conserves vitamins, according to results of investigations just reported to the American Chemical Society.

The greatest loss due to light is found when foods containing vitamin B_2 are cooked without covers.

In darkness almost all the vitamin is preserved. But losses by cooking in the light were as high as 48 per cent.—*Reuter.*

* * *

End of Wedding Cakes

Wedding and birthday cakes of the elaborately artistic and richly made type have disappeared for some time owing to war conditions. Now even the restricted examples available, mainly of one tier and generally covered and decorated with chocolate, are to follow suit. Under the new Cake and Flour Confectionery Order the charge for any cake must not exceed 1s. 6d. per lb.

Prominent manufacturers at a meeting of the Birmingham and Midland Federation of Master Bakers' Associations in Birmingham regretted this virtual prohibition, and a tentative motion that was put forward to request a modification of the Order permitting them to make a percentage of their output to sell at a higher price was defeated, the Federation President, Mr. Ernest Harding, thinking that there would be no hope of any such concession. The Minister had announced that the nation must be content with plainer cakes, the object being to conserve fats and sugar.

* * *

No Artificials for Sports Grounds

It is unpatriotic to use artificial fertilisers on sports grounds and lawns. Every ounce of plant food that can be produced is required for food production.

Phosphatic or potassic fertilisers must not be applied to grassland without the written consent of the local County War Agricultural Committee. Although no formal prohibition has been placed on the use of nitrogenous fertilisers, they should only be used in food production.

Sugar Confectionery Wartime Association

At the annual meeting of the Sugar Confectionery Wartime Association, the elected members of the Governing Committee, who took office as from November 1, are:

(A) *Boiled Sugar:* Messrs. H. Tavener (Tavener, Rutledge, Ltd.), S. W. Pascall (James Pascall, Ltd.), G. W. Morrison (Clarke, Nickolls and Coombs, Ltd.), W. F. Coutts (W. Coutts, Ltd.), H. Robson Roberts (Barker and Dobson, Ltd.).

(B) *Toffee and Caramel:* Messrs. J. H. Guy (John Mackintosh and Sons, Ltd.), W. J. Sharp (Edward Sharp and Sons, Ltd.), Lt.-Col. A. B. Walters (Walters' Palm Toffee, Ltd.). Sir Albert Wilkin (A. S. Wilkin, Ltd.).

(C) *Panned Goods and Lozenges:* Mr. H. O. Barratt (Barratt and Co., Ltd.).

(D) *Liquorice and Cream Paste:* Mr. E. M. Mott (G. Bassett and Co., Ltd.).

(E) *Pastilles, Clear Gums and Chewing Gum:* Messrs. P. Rowntree (Rowntree and Co., Ltd.) and D. Maynard (Maynards, Ltd.).

(F) *General Confectionery:* Messrs. L. E. H. Roberts (Meltis, Ltd.) and V. Joseph (J. Lyons and Co., Ltd.).

(G) *Small Manufacturers:* Messrs. H. Dixon, junr. (H. Dixon, Ltd.) and J. E. James (Whiteheads, Ltd.).

In addition there are two representatives of the Ministry of Food and one of the Co-operative Wholesale Society.

* * *

New Banana Variety

A new banana has been perfected by Jamaica agriculturists, and has been accepted by the Banana Board as a good substitute for the *Gross Michel* type of banana, which is fast disappearing owing to the "Panama disease".

The new banana is immune to this disease and can be exported.

* * *

"Cake Manufacture"

The second edition of *Cake Manufacture,* by E. B. Bennion and J. Stewart, will soon be published, price 21s. net.

British Food Mission for Australia

Mr. F. M. Forde, Deputy Prime Minister and Army Minister, announced recently that a small British food mission is going to Australia to collaborate with the Australian Food Council and with New Zealand on problems of joint interest to the three countries.

It will be headed by Mr. W. Bankes Amery and Mr. R. C. Hinton, of the British Ministry of Food, and will have its headquarters in Melbourne.

The sending of the mission follows a request by Mr. Curtin, the Prime Minister. It will not involve any change in the channels through which the British Ministry of Food makes its purchases in Australia.

* * *

Vitamin A for 9,000,000 People

The U.S. Department of Agriculture now has enough fish oil to provide vitamin A for 9,000,000 Allied troops and civilians for a whole year, it was announced at Washington.

In accordance with the Government's policy regarding all foods, supplies of this vitamin will be provided for the peoples of the occupied countries when they are freed from the German yoke.

* * *

Perch-Trapping Scheme

A further extension of the perch-trapping scheme, to include Scottish lochs and lakes in Eire, is planned for next year.

The scheme was started on a commercial basis last year, when about 30 tons of perch, trapped in Lake Windermere, were tinned by a Leeds firm of canners. This year the trapping was extended to most of the other waters in the Lake District, and also to Birmingham and Manchester reservoirs and a number of lakes in the Midlands, and the total catch canned has been increased to 50 tons.

The principal of the Leeds firm handling this new industry said recently that bad weather prevented the catch being considerably greater. If all the nets could have been emptied regularly, he thought the total yield would have reached about 100 tons.

Scottish Vegetable Canning

A development of major importance to Scottish food production and to the vegetable- and market-growing trades was announced by Mr. Thomas Johnston, Secretary of State for Scotland, when he spoke of vegetable canning to Scottish M.P.s recently.

Showing them tins of dehydrated vegetables, Mr. Johnston detailed steps which he was taking, the result of which will be to secure the production of dehydrated vegetables in Scotland. By this method the existing glut period in market gardening which had troubled producers for many years would be wiped out. A commercial outlet would be guaranteed to every grower of vegetables. This would have the natural response of creating a stimulated output, since the security of marketing would encourage development in the industry.

Commenting further on the improvement which had taken place in Scottish industry since the pre-war period, he said that it was hoped some of the newer factories would outlast the war and play their part in the industrial future.

* * *

Factory Ventilation

Official records state that forty million working weeks were lost last year due to illness in industry. Great concern is expressed by Government departments and authorities throughout the country regarding the detrimental effect of the blackout upon the health of workers caused through lack of efficient ventilation.

In the early days of 1940 an efficient blackout ventilator was made available, and during the 2½ years that have since passed improvements following upon extensive experiments have been made, and by the scientific analysis of existing conditions in any factory engaged upon wartime production it is now possible to establish a prescribed number of air changes per hour, according to the industry concerned, within the limits of natural ventilation.

Colt Ventilation, Ltd., who carried out the aforementioned experiments, have produced a booklet in which their system of night ventilation, and a new ventilator which is claimed to be revolutionary in design, are described.

Department of Scientific and Industrial Research

A review entitled *The Mode of Occurrence of Fatty Acid Derivatives in Living Tissues* has just been issued by the Food Investigation Board of the Department of Scientific and Industrial Research (Food Investigation Special Report No. 52).

It deals with the types of fatty acid derivative occurring in lipoidal extracts, with the dynamic state of lipoids in the tissues and mainly with the lipoid-protein and lipoid-carbohydrate complexes of animals and plants. The available evidence concerning these complexes is considered according to the experimental methods used—physical methods (histology, physical determinations), physiological studies (blood clotting, antigenic reactions), solvent extraction of tissues (animal tissues, vegetable tisues), experimental preparation of lipoid-containing complexes and isolation of natural lipoid complexes.

* * *

Engineering Directory

The latest edition of this directory has recently been published by the Bristol Engineering Manufacturers' Association, which has for its aims, among others, the provision of a publicity organisation for making Bristol engineering activities more widely known and the promotion of mutual assistance among members.

The directory contains a classified index of trades, together with an alphabetical list of manufacturers and suppliers. It also gives details of the Bristol Engineering Advisory Panel, which was set up to deal with the various problems arising out of the war. This panel is actually an enrolment of engineering firms, with an executive committee which meets as required.

* * *

Australian Rice

Australia's yield of rice is expected to be not less than 60,000 tons, which will be sufficient for Service, civilian and export demands, it was announced recently by Mr. Deiman, Commonwealth Minister for the War Organisation of Industry.

Mr. Howard V. Gibbons

Mr. Howard V. Gibbons, sales manager of the Pascall Engineering Co., Ltd., has now been appointed to the board of directors.

* * *

John Ferguson, Ltd.

From September 27 last the name of John Ferguson, Ltd., was changed to Meredith and Drew, Ltd.

* * *

OBITUARY

Mr. Allan R. Baker

We regret to record the death of Mr. Allan R. Baker on October 12 at the age of 63 years.

For 24 years Allan R. Baker had been chairman of Baker Perkins, Ltd., his immediate activities being concerned with the general administration of the business, particularly with accountancy and the firm's relationship with its personnel, and besides these his great interest lay in the company's associates in this country, on the Continent and overseas.

Throughout his tenure of the office of chairman Mr. Baker displayed in the highest degree the qualities required in a business active in many fields.

In private life he was a man of wide reading and interests, his particular leanings being towards the study of history and social questions.

Allan R. Baker inspired universal loyalty and affection. He worked conscientiously all his life and persevered long after failing health justified laying down his burden.

* * *

Mr. Horace Broadbent

The death occurred on October 20, at the age of seventy-nine, of Mr. Horace Broadbent, chairman and until recently managing director of Thomas Broadbent and Sons, Ltd., Central Ironworks. He had been actively associated with the firm until his illness of about twelve months ago.

He was a pioneer in the development of hydro-extractors and electric cranes, and the patentee of many revolutionary improvements in the design of centrifugal machinery. His firm were the first makers of direct steam-driven hydro extractors, direct electrically-driven hydro extractors, and of electric overhead travelling cranes. Mr. Broadbent himself was the designer of the first electric travelling crane made in Great Britain, and was the patentee of centrifugal friction clutches.

* * *

Ross Aiken Gortner

Ross Aiken Gortner, chief in the Division of Biochemistry at the University of Minnesota, eminent scientist and scholar, died at Minnetosa on September 30 at the age of 57.

Dr. Gortner's scientific interests were very broad. His contributions to scientific journals number more than 300. The chief fields covered in these papers are the black animal pigments, the melanins; proteins, especially the cereal proteins and their relation to the properties of flour and dough; colloids, especially their physico-chemical properties and the rôle of water in living processes.

One of Dr. Gortner's major contributions to scientific thought was his book, *Outlines of Biochemistry*, the second edition of which appeared in 1938. Another volume, *Selected Topics in Colloid Chemistry*, contained the lectures which he gave at Cornell University in 1930-36.

* * *

U.S. Crops Up by 25 Per Cent.

Mr. Claude Wickard, the U.S. Secretary of Agriculture, disclosed in a recent broadcast from Canada that United States crops had increased 25 per cent. over the 1935-39 average.

He praised American farmers for "doubling the production of oil-bearing crops to make them replace the supply lost when the Japanese shut off our shipments of vegetable oils from the Far East".

America in general must produce food for three large groups: the U.S. armed forces overseas with a few exceptions, America's Allies and the U.S. civilian population, he said.

OBITER DICTA

● For my two shops I am allowed enough sausage meat to make 450 lbs. of sausages for 2,700 people. You can't do it and be fair to your customers.—*A North London Butcher.*

● I am surprised that the trade press has not attacked much more forcibly this egregious zoning plan, which is chock-full of ridiculous anomalies, and is calculated to do the maximum of harm to the smaller manufacturer.—*An anonymous sweet manufacturer, writing to "Confectionery News".*

● We should be all right in the coming year as far as food is concerned. We may have to do without a little of this and a little of that, but anything we do miss will be just trimmings—and we can do without trimmings in the fourth year of war.—*Lord Woolton, speaking at Edinburgh.*

● It is apparent that we must not only preserve much of our perishable foods by dehydration; we must also compress the dehydrated products into smallest possible space.—*Editor, "Food Industries".*

● There is no love sincerer than the love of food.—*G. B. Shaw, "Man and Superman".*

● The responsibility for distribution of milk rests upon the Minister of Food, and at present some 70 per cent. of the milk supply is pasteurised before distribution to consumers. It is anticipated that the rationalisation of wholesale and retail distribution now being undertaken will result in a larger proportion of supply being pasteurised.—*Mr. Mabane in the House of Commons.*

● A consultant scientist has discovered that sugar can be extracted from potato starch. The new sugar—practically indistinguishable from cane sugar—should be available very early next year.—*"Manchester Sunday Chronicle".*

● I am convinced digestion is the great secret of life; and that character, talents, virtues, and qualities are powerfully affected by beef, mutton, piecrust, and rich soups.—*Sydney Smith, September 30, 1837.*

Non-Ferrous Metal Urgently Needed

Copper, lead, tin, zinc—mined in Africa, North and South America, and Australia — are urgently wanted in pure form for work, and as urgently required because they provide between them in alloyed form brass, bronze and anti-friction bearing metal.

To speed up the supply of non-ferrous metals and to save as much shipping as possible, the Ministry of Supply has issued an urgent appeal for all unwanted copper, zinc, lead, pewter, white metal, brass, bronze and scrap aluminium.

The food trades can greatly help this campaign by giving all unwanted or useless articles of non-ferrous metals which they can find.

They are earnestly requested to make a search for such things as copper cable, boilers, vats, tube, wire; zinc foil and counter fittings; lead pipe and sheeting; pewter chocolate and sweet moulds; bronze bearings, bushes, cocks, crown wheels, couplings, unions, valves; brass pipe and tube; white metal solder waste; aluminium (and its alloys) cooking utensils, foil; Monel metal fittings.

Utensils or moulds which are still in use should *not* be given.

Non-ferrous metals may be disposed of as follows:

1. To a depôt specially provided by the local authority, or
2. To a scrap-metal merchant.

* * *

Coal follows Sugar

Food and coal are both being sought in Nottinghamshire. Sugar beet is growing in fields overlying a shallow seam of coal, and in one case huge excavators, capable of paring yards of soil at a time, are opening up the coal crop as the food crop is removed.

The method is to remove first top soil and then the subsoil. Each is deposited in a different place, and after the coal has been removed the whole site is "back filled", the subsoil and top soil being replaced in their original positions.

Some experts say that crops can be grown on this land the following year, but local farmers are dubious.

Spices and Essential Oils

The market for peppermint oil continues firm with limited supplies available. With the Ministry of Food's Essential Oil Scheme taking shape, there has been little buying of the oil. It is not known what, if any, American oil the Ministry has coming forward or already here, or at what price it will be offered by the allocation control. Small stocks of lemon oil are still available. The Ministry of Food will probably bring over the Californian and Palestinian oils, but so far the stage has not been reached when the Ministry oil is here and ready to be allocated.

Spot stocks of orange oil continue plentiful, but lime oil is very scarce. Fair supplies of clove oil are still available.

A steady demand continues for both acacia and tragacanth gums. The Ministry of Supply is taking an interest in both these products, so the control may come in at some future date. At the moment there are good stocks available.

Of cinnamon, ground mixed spice, nutmegs, there are moderate supplies. Considerable quantities of vanilla beans have recently arrived, but the price continues very high. Vanilla essences suitable for different types of products are available.

The foregoing details have been taken from the October, 1942, Market Report of Stafford Allen and Sons, Ltd.

* * *

Industrial Truck Manufacturers' Association

An association entitled the "Industrial Truck Manufacturers' Association" has recently been formed, consisting of concerns who are manufacturers of power-operated industrial works trucks, tractors or trailers and ancillary equipment, which are primarily for internal works use. The association will form a medium through which Government Departments can consult the industry on all matters on which the guidance of industrial truck manufacturers as a body is sought.

The association will deal with technical and other matters aimed not only at reaching the maximum of efficiency in production of industrial trucks, but also at bringing to the notice of industry in general the extent to which industrial trucks can be utilised to expedite all types of production and to assist in releasing labour for more important work. It is hoped that the combination of these activities of the association will constitute a valuable contribution towards the war effort, and that, when hostilities have ceased, the association will serve a useful purpose in helping British industry to overcome the difficulties of the transition period from war to peace.

The affairs of the association will be conducted through the secretaries: Peat, Marwick, Mitchell and Co., York Mansion, 94-98, Petty France, Westminster, S.W. 1, and the following is a list of the members:

Abtus, Ltd., Aero Engines, Ltd., Douglas (Kingswood), Ltd., Bretts Patent Lifter Co., Ltd., Brush Electrical Engineering Co., Ltd., Cleco Electric Industries, Ltd., Electricars, Ltd., Greenwood and Batley, Ltd., Lansing, Bagnall and Co., Ltd., R. A. Lister and Co., Ltd., Mercury Truck and Tractor Co., Ltd., Ransomes, Sims and Jefferies, Ltd., Victor Electrics, Ltd., Wingrove and Rogers, Ltd., and Yale and Towne Manufacturing Co.

* * *

Spice Brokers' Meeting

A meeting of spice brokers held in London recently unanimously resolved to form a separate section of the General Produce Brokers' Association for those firms acting as brokers in spices. All firms acting as brokers in spices were invited to register.

* * *

U.S. to Ration Coffee

Coffee is being rationed in the United States from November 29 at the rate of 1 lb. every five weeks for each person over fifteen years of age. This works out at slightly more than a cup a day per person.

* * *

New Books

The second editions of *Sausage and Small Goods Manufacture*, by Mr. Frank Gerrard, and *Fuel Testing*, by Dr. G. W. Himus, are now ready.

United Dairies, Ltd.

The annual general meeting of United Dairies, Ltd., was held in London recently, Mr. J. H. Maggs, the chairman, presiding.

In the course of his statement circulated with the reports and accounts, he discussed several items in the accounts, war damage, etc. He pointed out that the company's milk businesses continued to be operated entirely under the control of the Ministry of Food as regards manufactured dairy products. The Ministry directs the type of goods to be made and takes over the products when manufactured at fixed prices. On the liquid milk side it fixes priorities, and in the months of scarcity limits the quantities to be distributed to the ordinary consumer. He thought that they must acknowledge the great debt the public and the trade owe to the Minister of Food for the orderly and smooth way in which distribution of milk had been maintained.

Under the new scheme, which came into force on October 1—the purpose of which is to give greater elasticity to the milk movements branch of the Ministry—they had to surrender all direct contact with our farmer friends. The whole of the milk will now be purchased by the Milk Marketing Board and resold to the Ministry of Food, who will direct the destination of each farmer's supply. While naturally regretting that this severance of contractual relations with the individual farmers, in practice any large-scale interference with the present conditions was not anticipated.

Mr. Maggs reviewed the important contributions of the scientific staff in improving and assuring the quality of supplies of milk and of all dairy products, and it was a matter of satisfaction to the Board that, in spite of increasing difficulties in maintaining staff and also the supplies of necessary materials, no essential control has been sacrificed. Mr. Maggs viewed with pleasure the newly adopted scheme of Government testing of the quality of milk as produced, and he believed it to be based on a principle long since applied in the company's laboratories in the control of their own supplies—namely, that the excellence of the bulk supply is mainly dependent on the exclusion of a minor percentage of the total production.

A tribute was paid at the meeting to Mr. Maggs, who is relinquishing the chairmanship of the company. He has taken a leading part in the organisation for over fifty years, and has been chairman and managing director for the past twenty-one years. He now feels that the time has arrived when the interests of the company would be best served by appointing a younger man as chairman.

* * *

Cerebos, Ltd.

Cerebos, salt manufacturers, etc., is again paying an interim dividend of 10 per cent. This is at the same rate as for each of the six preceding years, when it has been followed by a final of 30 per cent.

* * *

Bovril, Ltd.

The directors of Bovril have made a call of 2s. per share on the 500,000 4½ per cent. preference shares of £1 each, and this is now payable.

The call, which totals £50,000, has been made to provide additional working capital.

The shares were issued to shareholders at par in May, 1934; 1s. per share was paid on application, 1s. per share on allotment, and 4s. per share on September 29, 1934.

The issue was made to repay notes and debentures, and it was intimated that it was the intention to call up 8s. per share, leaving 12s. per share uncalled. That is still the intention.

* * *

The Mechanical Adhesive Tape Manufacturers' Advisory Committee

At the request of the Rubber Control, the Mechanical Adhesive Tape Manufacturers'. Advisory Committee was formed to scrutinise all orders for adhesive tapes so as to minimise the use of rubber. At the same time a Technical Committee was formed which is composed of the chemists of the various tape manfacturers, who are working hard to produce a rubberless pressure-sensitive tape which will have the desired effect of sealing a container against atmospheric conditions.

Progress has already been made, and some of the experiments, showing a big reduction in rubber, are well beyond the laboratory stage, and some products are already on the market.

It is anticipated that in the near future cellulose and cloth pressure-sensitive tapes will be available with little or no rubber content. This, however, does not mean to say that large quantities of tape will be available, because priority channels for the prosecution of the war are requiring large quantities, and therefore all plant is primarily occupied in carrying out this work.

The Committee naturally looks upon food as a very important contribution to the war effort, and will give all applications very careful and sympathetic consideration; if they decide against the issue of such tape they will endeavour to assist the packers with alternatives.

* * *

Control of Factory and Storage Premises

By a new Order—Location of Industry (Restriction) Order, S.R. & O. 1942, No. 2072—which revokes the 1941 Order, a licence must now be obtained whatever the size of the premises. Goods may be temporarily stored for 28 days without a licence under the existing General Licence, which remains in force. Licences issued under the earlier Order remain valid. No application for a licence need be made in order to continue to carry on business on premises which were exempt under the Order. The new Order came into force on October 12, and copies are obtainable from H.M. Stationery Office or through any bookseller (price 1d., or 2d. post free). Further information concerning the scope of the Order may be obtained from the Regional Offices of the Control of Factory and Storage Premises, or from local Chambers of Commerce.

* * *

Mr. Leonard Maggs

Following the retirement of his brother, Mr. J. H. Maggs, Mr. Leonard Maggs has been appointed Chairman of United Dairies, Ltd.

Information and Advice

Preserving Whole Red Tomatoes

8,312. *Wanted, a recipe for the preserving of whole red tomatoes in jars.* (Eire.)

These must be selected of proper size to go into jars. Place them in lukewarm water containing a handful of salt to each twelve gallons of water. Bring slowly to the boil, picking the tomatoes with a skimmer and plunging them in cold water. Put them in jars and fill up with cold brine, composed of water 20 gallons, salt 4 lbs. Process as follows:

2 lbs. ...	...	8 minutes at 235° F.
3 lbs. ...	...	10 ,, at 235° F.

It is just as well to run a few trials to confirm the processing time, as conditions which govern such time vary.

Tomato Purée

8,312. *Wanted, a recipe for making Tomato Purée.* (Eire.)

These are strained tomatoes concentrated by evaporation, with or without the addition of salt, and contain not less than 22 per cent. of tomato solids. The tomatoes are cut up and slowly heated to boiling point, which requires about ten minutes to separate the coarse pieces from the clear juice. This juice is drawn off and evaporated separately while the coarse pieces are run through a machine to remove seeds and skins. The concentrated juice is then mixed with the thick pulp. The purée is made in copper kettles, and the more rapid the concentration, the better colour and flavour. Salt is added to the rate of about 1 per cent. Dissolve it in a small quantity of water and put it into the pan when the paste is about finished. If the tomatoes have a poor colour, artificial colour is sometimes added.

After putting into tins or jars the purée must be sterilised. As an indication of this as a basis for experiment, 4-6 oz. cans have been processed for 43 minutes at 212° F.

Meat Pastes

8,419. *Required, recipe for meat pastes.* (Glos.)

The following recipe is contained in *Sausage and Small Goods Manufacture*, by Frank Gerrard:

HAM AND TONGUE PASTE

8 lb. of corned beef (or lean cooked pieces).
2 lb. boiled bacon.
2 lb. cooked tongue (pig, sheep or ox pieces).
2 lb. fat.

The seasoning for the above could be:

1 oz. ground white pepper.
½ oz. ground parsley.
½ oz. ground marjoram.
¼ oz. ground cayenne.
Salt, *q.s.*

Method.—The amount of salt added will depend upon the salt content of the meats used. Cut the meat into cubes and break down on the mincer; add the seasonings, and well mix to obtain an even distribution. Mix in the fat, and then pass the mass through the fine plate of the mincer twice, in order to obtain a smooth consistency. Pack down tightly into dishes, smooth over the surface, and pour on a layer of melted fat. In hot weather a clarified mutton fat will give a harder surface. A fine rusk is added to the mixture in the required amount. If the meats have been properly cured it may not be necessary to add colouring matter, but if cereal is included a coloured rusk should be used.

If there are any beef sinews, pork rinds, or snouts available, they can be rendered down to give a good jelly stock and the minced paste meat added to the hot jelly. It should be thoroughly mixed, and heated for a few minutes. The paste can be filled into containers while it is fairly hot. With this method one can allow about 25 per cent. of jelly stock in the finished paste. If the jelly stock is lacking in body, gelatine may be added. It is, of course, necessary to adjust the quantity of seasonings to allow for the increase.

Under present conditions this recipe cannot be adopted without modification. According to Statutory Rules and Orders, 1942, No. 1381, "The Meat Products and Cooked Meat (Control and Maximum Prices) Order," dated July 13, 1942, the prescribed meat content of meat or fish paste must not be less than 40 per cent. and not more than 60 per cent. The meat content of any product shall be ascertained by calculating the percentage of the weight when raw of all meat and, in the case of any paste, of all fish, contained in the product relative to the total weight thereof. It will therefore be realised that the amount of rusk added must be such that the final product adheres to statutory requirements.

Information Supplied

8,291. *Proportions for blending various ingredients of prepared seasoning. Also formula for salmon and fish pastes, and formula for liquid gravy browning. Also the proper grade of sugar used in the manufacture of lemonade crystals.* (Newfoundland.)

8,292. *Machine for the grinding of Gum Tragacanth.* (Scotland.)

8,293. *Manufacturers of machines for making alimentary pastes, spaghetti, etc.* (London.)

8,296. *Manufacturers of envelopes.* (Wales.)

8,303. *Information concerning registration for Purchase Tax for the manufacture of Cattle, Poultry and Pig Food supplements.* (Cheshire.)

8,308. *Bean and Celery Cutting machine and a Cabbage Shredding machine suppliers.* (Norfolk.)

8,309. *Fats used in manufacture of margarine, and the composition of typical margarines prior to outbreak of war.* (Yorkshire.)

Information Required

8,372. *Machine required for cutting prunes and removing the stones.* (Yorkshire.)

8,406. *Suppliers of brined herring.* (Lancashire.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Improvements in and Relating to Methods of and Apparatus for Hermetically Closing Cans

This invention relates to methods of and apparatus for hermetically closing cans, and has for its main object to improve the elimination of air from the head space of a can.

A method of eliminating air from the head space of a can consisting in passing steam across the head space of the filled can from one side only of the can so as to eliminate air therefrom during relative movement between the can and the can end at the seaming station for placing the can and the can end in proper position preparatory to the seaming operation.

A method of eliminating air from the head space of a can immediately prior to end seaming, consisting in projecting steam in one direction across the mouth of the can from one side only of the can so as to drive out the air in the head space and whilst steam fills the head space applying the end to closure the can preparatory to end seaming on the end.

A method of eliminating air by utilising high-pressure steam whereby the air is swept or drawn out of the head space by the relatively high velocity and a higher vacuum in the head space obtained by condensing the steam from an elevated temperature after the end seaming operation.

A can closing machine wherein the supporting or centring plate is contructed and arranged so as to provide means for directing steam in one direction across the head space of the filled can for effectively driving out the air while the can and the can end are moved relative to one another at the seaming station preparatory to the seaming operation.

Among other claims a centring plate for a can closing machine comprising jets opening inwardly on one side only of the opening through which the can passes to seaming rolls, and a seating in the plate for a can end immediately above the jets whereby steam may be delivered to the jets to provide streams in one direction across the head space of the can immediately prior to the seating of the end on the mouth of the can preparatory to the end seaming operation.

547,122. Continental Can Company, Inc.

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

545,873. CANNON IRON FOUNDRIES, LTD., CLAYTON, R. T., and OATLEY, A. F.: Heating of ovens and hot chambers of gas-heated cooking apparatus.

545,902. GOULD, S. L. BARING-: Coffee infuser.

545,913. DORR CO., INC.: Purification of liquids.

545,922. LEWIS, E. S.: Extraction of sugar from sugar beet and like vegetables.

546,014. SEALDSWEET SALES ASSOCIATION: Juice-extracting machines.

546,118. ELLIS, S. S. C., and GLAZEBROOK, C.: Heating or cooling of canned foodstuffs ready for use.

546,207. STOCKHAMER, P.: De-salting of fish.

546,214. STOCKHAMER, P.: Preservation of fish by salting.

546,328. KING, J.: Potato harvesting machine.

546,344. KLEENTAINERS (BRITISH AND OVERSEAS), LTD., and WARE, H. M.: Sealable bottles and like containers.

546,365. ELECTROLUX, LTD.: Apparatus for separating liquid from solid matter, such as juice-extracting apparatus.

546,374. ARCHER, D. T., and NATIONAL ICE AND COLD STORAGE CO., LTD.: Method of and means for shelling eggs.

546,429. HARBER, L. S., and BAKER PERKINS, LTD.: Manufacture of tin bread.

546,443. SCHLUMBOHM, P.: Filtering device.

546,447. EVERETT, S. M., and PEERS, A. E.: Process for preparing products for edible and other purposes from whey obtained from milk, either as a product of cheese manufacture or otherwise.

546,456. LUMSDEN AND MACKENZIE, LTD., GARRETT, C., and ADDIE, J. A.: Substitute for glass and method of producing same.

546,489. CROWN CORK AND SEAL CO., INC.: Manufacture of seamless containers.

546,593. STEVENS, A. H. (ARMOUR AND CO.): Processes of preserving dairy products and the improved dairy products resulting therefrom.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

KENN-O-MEAT.—615,539. Meatfoods for animals. **Newforge, Ltd.,** Newforge Factory, Malone, Belfast, Northern Ireland; Merchants. To be Associated with No. 535,134 (2850) xlii.

PERLO.—618,412. Flavourings (other than essential oils) and pudding mixtures. **British Fermentation Products, Ltd.,** Chieftain Works, Putney Bridge Road, London, S.W. 15; Manufacturers. To be Associated with No. 618,414 (3360) xxx and others.

ASCOL.—618,876. Chocolate, chocolate confectionery, cocoa, and preparations of chocolate for use by bakers and confectioners. **Anglo-Swiss Chocolate Co., Ltd.,** 195, Park Road, Crouch End, London, N. 8; Manufacturers. (By Consent.)

COUVERITE.—618,877. Chocolate, chocolate confectionery, cocoa, and preparations of chocolate for use by bakers and confectioners. **Anglo-Swiss Chocolate Co., Ltd.,** 195, Park Road, Crouch End, London, N. 8; Manufacturers.

ESKIMO.—B618,969. Chocolate O.P. **Chocolate Specialities (Manufacturers), Ltd.,** Treforest Trading Estate, Pontypridd, Glamorgan; Chocolate Manufacturers.

New Companies

A. J. Hughes, Limited. (375805.) 130, Carshalton Road (West), Sutton, Surrey. To carry on bus. of bakers, confectioners, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: A. J. Hughes, 130, Carshalton Road (West), Sutton, Surrey; Doris E. Hughes, 130, Carshalton Road (West), Sutton, Surrey; Jessie K. Hughes, 23, King's Lane, Carshalton, Surrey.

Deva Dairies, Limited. (375812.) To take over the businesses of any dairymen and creamery proprietors in the Chester district who wish to amalgamate with a view to economies in distribution, labour and materials, etc. Nom. cap.: £25,000 in £1 shares. (3,000 non-cum. pref. and 22,000 ord.). Dirs.: H. T. Radcliffe, Brook Lodge, Rowton, Chester; C. M. Dodd, Blacon House Farm, Blacon, Chester; J. Williams, 34, Chapel Lane, Boughton, Chester.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.

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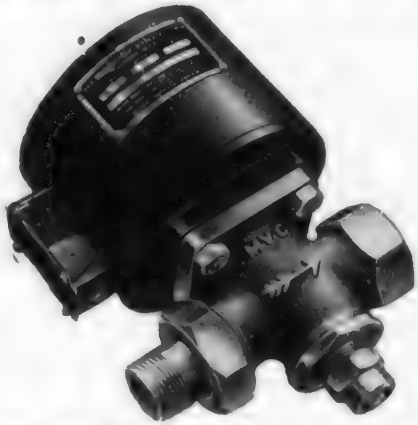

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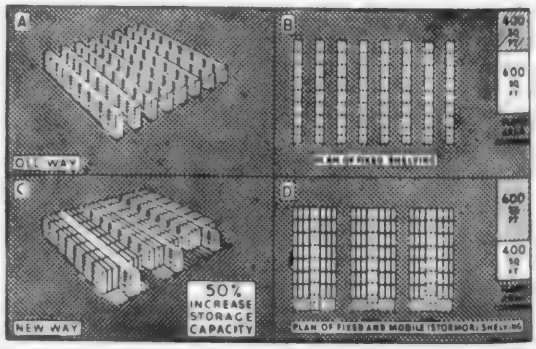

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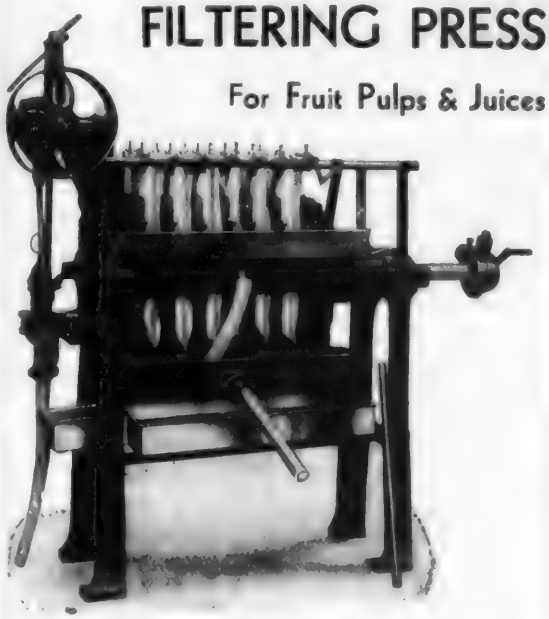

The pulp is first squeezed in bags hung between the plates, and distance frames are then inserted in the machine for the subsequent filtration of the expressed juice. The apparatus is, therefore, ideal for the small manufacturer, as the necessity for separate machines for pulp and juice filtration is obviated.

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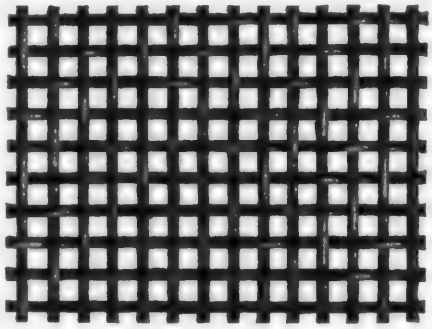

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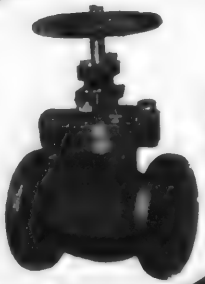

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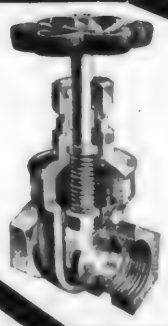

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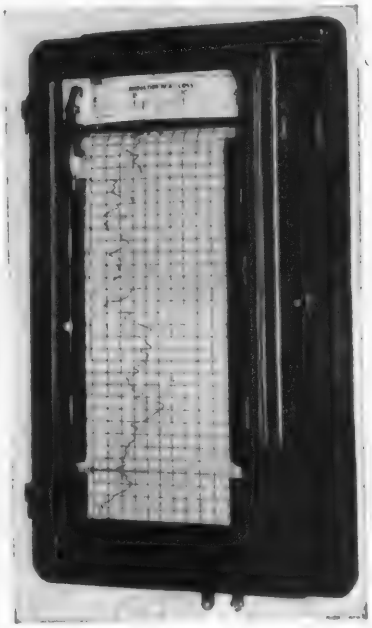

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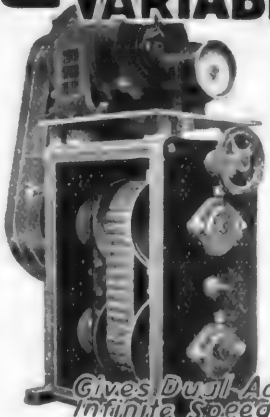

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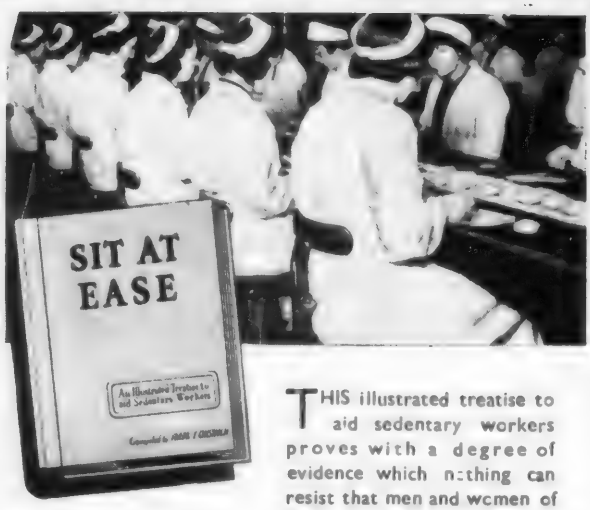

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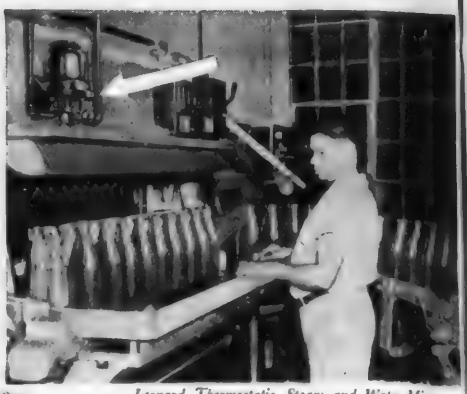

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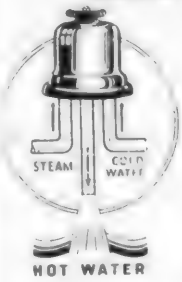

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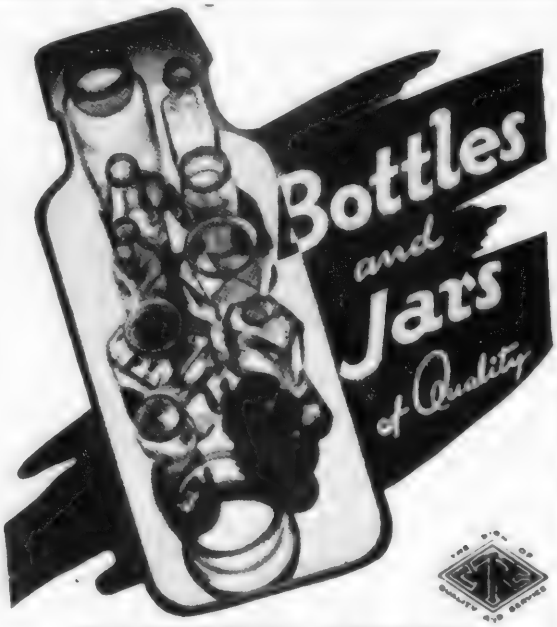

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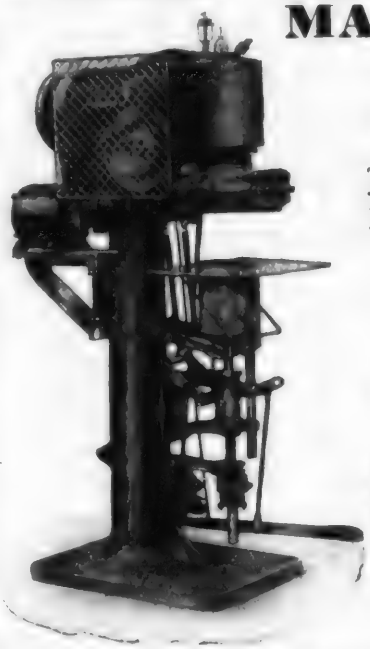

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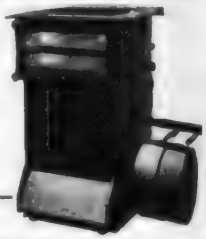

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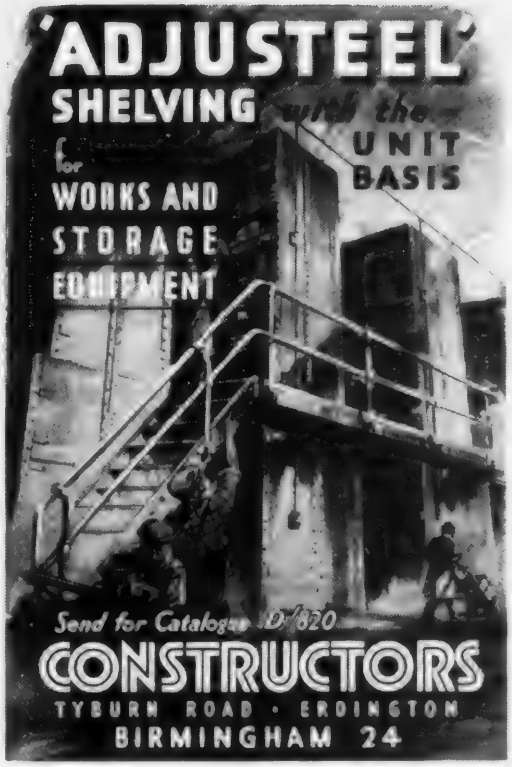

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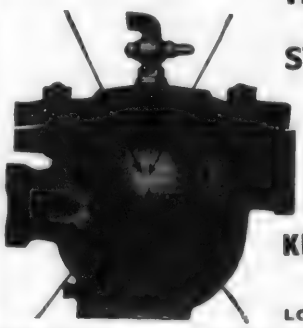

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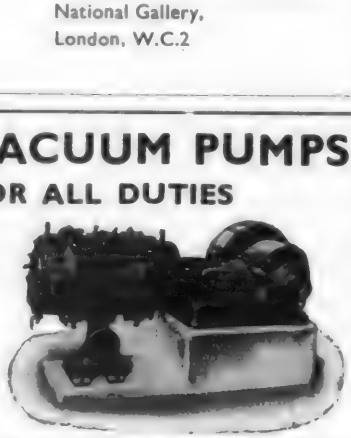

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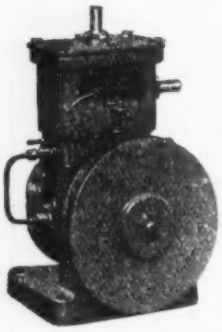

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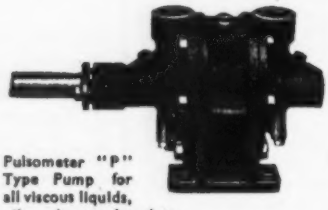

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